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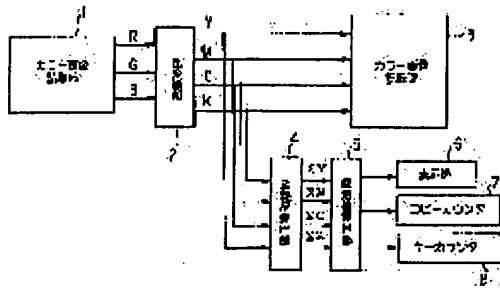
(54) IMAGE FORMING DEVICE

(57)Abstract:

PURPOSE: To provide an image forming device constituted so that the recording speed thereof is high, the set of a price with respect to a user can be made different according to printing ratio and the recording of a using state can be practically used as the index of maintenance and the like.

CONSTITUTION: First color data R, G and B is outputted by reading a set color original by a color image read part 1 and converted into second color data Y, M, C and K corresponding to the color components of a real recording material by a color conversion part 2. Based on the second color data, the consumption of the respective recording material equivalent to one color picture frame is calculated by a consumables calculation part 4. Based on the consumption, the originals are sorted to any one of the nearly monochromatic original, the line-drawing color original and the full-color original by a cost value calculation part 5. Then, a cost value is calculated according to a cost value ratio corresponding to the

sorted result and displayed at a display part 6. Besides, the statics of the using quantity of the recording material is taken (9) and the information thereof is provided outside by a communication unit.





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**CLAIMS**

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[Claim(s)]

[Claim 1] In the image formation equipment which reads a color picture and forms the duplicate image of this color picture An output means to separate the color of said color picture and to output the 1st color picture data, A color conversion means to change said 1st color picture data outputted with this output means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, It carries out based on said 2nd color picture data changed with this color conversion means. It carries out based on the consumption of said record material computed with a consumption calculation means to compute the consumption of said record material, and this consumption calculation means. Image formation equipment characterized by providing a costs value calculation means to compute the costs value of said color picture, and an image formation means to form the duplicate image of said color picture based on said 2nd color picture data.

[Claim 2] In the image formation equipment which reads a color picture and forms the duplicate image of this color picture An output means to separate the color of said color picture and to output the 1st color picture data, A color conversion means to change said 1st color picture data outputted with this output means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, It carries out based on the 2nd color picture data changed with this color conversion means. The consumption of said record material computed with a consumption calculation means to compute the consumption of said record material, and this consumption calculation means Image formation equipment characterized by providing a costs value decision means to classify into two or more phases defined beforehand, and to determine the costs value of said color picture according to the classified phase, and an image formation means to form the duplicate image of said color picture based on said 2nd color picture data.

[Claim 3] In the image formation equipment which reads a color picture and forms the duplicate image of this color picture An output means to separate the color of said color picture and to output the 1st color picture data, A color-conversion-means-to-change-said 1st-color picture data outputted with this output means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, It carries out based on said 2nd color picture data changed with this color conversion means. A consumption calculation means to compute the consumption of said record material, and the consumption of said record material computed with this consumption calculation means, It carries out based on a difference with the consumption of the record material of the sepia component obtained based on said 2nd color picture data. Image formation equipment characterized by providing a costs value calculation means to compute the costs value of said color picture, and an image formation



means to form the duplicate image of said color picture based on said 2nd color picture data.

[Claim 4] In the image formation equipment which reads a color picture and forms the duplicate image of this color picture An output means to separate the color of said color picture and to output the 1st color picture data, A color conversion means to change said 1st color picture data outputted with this output means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, Thin out said 2nd color picture data changed with this color conversion means, and it carries out based on the 2nd image data which performed this infanticide. It carries out based on the consumption of the record material computed with a consumption calculation means to compute the consumption of said record material, and this consumption calculation means. Image formation equipment characterized by providing a costs value calculation means to compute the costs value of said color picture, and an image formation means to form the duplicate image of said color picture based on said 2nd color picture data.

[Claim 5] In the image formation equipment which reads a color picture and forms the duplicate image of this color picture An output means to separate the color of said color picture and to output the 1st color picture data, A color conversion means to change said 1st color picture data outputted with this output means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, It carries out based on said 2nd color picture data changed with this color conversion means. It carries out based on the consumption of said record material computed with a consumption calculation means to compute the consumption of said record material, and this consumption calculation means. Image formation equipment characterized by providing a costs value calculation means to compute the costs value of said color picture, a display means to display the costs value computed with this costs value calculation means, and an image formation means to form the duplicate image of said color picture based on said 2nd color picture data.

[Claim 6] In the image formation equipment which reads a color picture and forms the duplicate image of this color picture An output means to separate the color of said color picture and to output the 1st color picture data, A color conversion means to change said 1st color picture data outputted with this output means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, It carries out based on said 2nd color picture data changed with this color conversion means. It carries out based on the consumption of said record material computed with a consumption calculation means to compute the consumption of said record material, and this consumption calculation means. A costs value calculation means to compute the costs value of said color picture, and a display means to display the costs value computed with this costs value calculation means, Image formation equipment characterized by providing an image formation means to form the duplicate image of said color picture based on said 2nd color picture data when formation activation directions of a predetermined duplicate image are after the costs value was displayed with this display means.

[Claim 7] In the image formation equipment which reads a color picture and forms the duplicate image of this color picture An output means to separate the color of said color picture and to output the 1st color picture data, A color conversion means to change said 1st color picture data outputted with this output means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, It carries out based on said 2nd color picture data changed with this color conversion means. It carries out based on the consumption of said record material computed with a consumption calculation means to



compute the consumption of said record material, and this consumption calculation means. The costs value computed with a costs value calculation means to compute the costs value of said color picture, and this costs value calculation means is integrated. Image formation equipment characterized by providing an addition display means to memorize and display the addition value, and an image formation means to form the duplicate image of said color picture based on said 2nd color picture data.

[Claim 8] In the image formation equipment which reads a color picture and forms the duplicate image of this color picture An output means to separate the color of said color picture and to output the 1st color picture data, A color conversion means to change said 1st color picture data outputted with this output means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, It carries out based on said 2nd color picture data changed with this color conversion means. It carries out based on the consumption of said record material computed with a consumption calculation means to compute the consumption of said record material, and this consumption calculation means. Image formation equipment characterized by providing an addition display means for said body of equipment to be equipped with free [ attachment and detachment ], to integrate the costs value computed with said costs value calculation means, and to memorize and display the addition value as a costs value calculation means to compute the costs value of said color picture.

[Claim 9] In the image formation equipment which forms the duplicate image of a color picture sent through a communication network A receiving means to receive the 1st color picture data sent through said communication network, It carries out based on said 2nd color picture data changed with a color conversion means to change said color picture data received with this receiving means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, and this color conversion means. It carries out based on the consumption of said record material computed with a consumption calculation means to compute the consumption of said record material, and this consumption calculation means. Image formation equipment characterized by providing a costs value calculation means to compute the costs value of said color picture, and an image formation means to form the duplicate image of said color picture based on said 2nd color picture data.

[Claim 10] In the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data A conversion means to change said 1st color picture data into the 2nd color picture data, An image formation means to form the duplicate image of said 1st color picture using record material based on said 2nd color picture data, A means to compute the consumption of said record material from said 2nd color picture data, Image formation equipment characterized by providing a means to compute the costs value of the duplicate image of said 1st color picture, and a means to transmit said costs value to an external device through a public line, based on said computed consumption.

[Claim 11] In the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data A conversion means to change said 1st color picture data into the 2nd color picture data, An image formation means to form the duplicate image of said 1st color picture using record material based on said 2nd color picture data, A means to compute the consumption of said record material from said 2nd color picture data, Image formation equipment characterized by providing a means to compute the costs value of the duplicate image of said 1st color picture, a means to compute a statistics processing result by carrying out statistics processing of said costs value, and a means to transmit said statistics processing result to an external device through a public line, based on said computed



consumption.

[Claim 12] It is image formation equipment according to claim 10 characterized by transmitting the count of the image formation counted for every phase of this when said transmitting means classifies the consumption of said record material into two or more steps in the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data.

[Claim 13] It is image formation equipment according to claim 10 characterized by transmitting the count of the image formation counted to fixed time amount for every phase of this when said transmitting means classifies the consumption of said record material into two or more steps in the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data.

[Claim 14] In the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data A conversion means to change said 1st color picture data into the 2nd color picture data, An image formation means to form the duplicate image of said 1st color picture using record material based on said 2nd color picture data, Image formation equipment characterized by providing a means to compute the consumption of said record material from said 2nd color picture data, a means to compute a statistics processing result by carrying out statistics processing of said costs value, and a means to display said statistics processing result.

[Claim 15] In the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data A conversion means to change said 1st color picture data into the 2nd color picture data, An image formation means to form the duplicate image of said 1st color picture using record material based on said 2nd color picture data, Image formation equipment characterized by providing a means to compute the consumption of said record material from said 2nd color picture data, a means to compute a statistics processing result by carrying out statistics processing of said consumption, and a means to transmit said statistics processing result to an external device through a public line.

[Claim 16] In the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data A conversion means to change said 1st color picture data into the 2nd color picture data, An image formation means to form the duplicate image of said 1st color picture using record material based on said 2nd color picture data, Image formation equipment characterized by providing a means to compute the consumption of said record material from said 2nd color picture data, a means to compute the statistics processing result for every fixed time amount by carrying out statistics processing of said consumption, and a means to display said statistics processing result.

[Claim 17] In the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data A conversion means to change said 1st color picture data into the 2nd color picture data, An image formation means to form the duplicate image of said 1st color picture using record material based on said 2nd color picture data, Image formation equipment characterized by providing a means to compute the consumption of said record material from said 2nd color picture data, a means to compute the statistics processing result for every fixed time amount by carrying out statistics processing of said consumption, and a means to transmit said statistics processing result to an external device through a public line.

[Claim 18] In the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data A conversion means to change said 1st color picture data into the 2nd color picture data, An image formation means to form the duplicate



image of said 1st color picture using record material based on said 2nd color picture data, A means to compute the consumption of said record material from said 2nd color picture data, Image formation equipment characterized by providing a means to compute the statistics processing result of having carried out statistics processing of the count of the image formation counted for every phase of this when classifying said consumption into two or more steps, and a means to display said statistics processing result.

[Claim 19] In the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data A conversion means to change said 1st color picture data into the 2nd color picture data, An image formation means to form the duplicate image of said 1st color picture using record material based on said 2nd color picture data, A means to compute the consumption of said record material from said 2nd color picture data, Image formation equipment characterized by providing a means to compute the statistics processing result of having carried out statistics processing of the count of the image formation counted for every phase of this when classifying said consumption into two or more steps, and a means to transmit said statistics processing result to an external device through a public line.

[Claim 20] In the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data A conversion means to change said 1st color picture data into the 2nd color picture data, An image formation means to form the duplicate image of said 1st color picture using record material based on said 2nd color picture data, Image formation equipment characterized by providing a means to compute the consumption of said record material using a formula from said 2nd color picture data, and a means to change the parameter of said formula by actuation from the outside.

[Claim 21] In the image formation equipment which reads a color picture and forms this duplicate image A receiving means to receive said color picture data, and an image formation means to form the duplicate image of said 1st color picture using at least two or more kinds of record material based on said color picture data which said receiving means received, A 1st calculation means to compute each consumption of said record material used by said image formation means, Image formation equipment characterized by providing a 2nd calculation means to compute the costs value of the image formation of said duplicate image, and a means to tell a user about said costs value computed with said 2nd calculation means, based on the consumption of the record material computed by said 1st calculation means.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the image formation equipment which forms the duplicate image of color pictures, such as a color copying machine.

[0002]

[Description of the Prior Art] Generally, a color copy is roughly classified according to the rate of printing at three sorts. They are three kinds of about 10% of common documents of the photograph and printed matter of 50% or more of rates of printing represented by natural drawing, about dozens of% of presentation data which made the graph and the graphic form the subject, and an alphabetic character and a table subject.

[0003] Conventionally, although there were only a photograph and printed matter when calling it



the color copy of personal appearance, PURIZENTESHON data come to be colorized by the appearance of a color personal computer or a color printer, and a color began to be further used from alphabetic character emphasis and a ruled line display of a common document by cheapization of these colors OA equipment. Therefore, the present condition is that the rate of printing of a color copy has been decreasing rapidly.

[0004] Now, the rapidity which can record several [ per minute ] sheets is bought, and the color copying machine which reproduces a color copy has an electrophotography method in use. The running cost is prescribed by the price per sheet, and is unrelated to the height of the rate of printing. Since the rate that having spread for the monochrome alphabetic character manuscript [ being-low (several-%) ] of the rate of printing and the optical semi-conductor drum of an article of consumption occupy from a short life to a running cost at the beginning was large, the electrophotography copying machine was seldom dependent on the consumption of a toner, and this had become a running cost setup per sheet. Furthermore, since the color copying machine for a color copy has a substantially high rate of printing and there is little total demand of a color toner, the running cost is set up by dozens times the monochrome copying machine.

[0005]

[Problem(s) to be Solved by the Invention] Thus, in the color copying machine by the electrophotography method in which a recording rate has engine performance sufficient as a color copying machine at high speed, the price of the copy per sheet is not concerned with the rate of printing of a color copy, but the color copy with the high rate of printing and the low color copy are prescribed by the fixed price. For this reason, when, reproducing a color copy with the low rate of printing for example, there is a problem that the price to the user more than a substantial running cost will be set up and charged.

[0006] Moreover, also in the color copying machine, the approach of a service maintenance according to every fixed period and copy number of sheets is further adopted like the monochrome copying machine. Although the toner of four colors is used for the color copying machine and four stages also of imaging processes also exist, the frequency where each is used changes greatly with classes of manuscript, and tends to produce excess and deficiency from the class of manuscript being different for every user etc. in an uniform service maintenance. For this reason, there is also a problem that the situation of a useless maintenance or a thoughtless maintenance has occurred.

[0007] Moreover, even if it records use record of the record material by further two or more users on memory etc., it also has the problem that this use record is unutilizable as a guide of a maintenance, in the condition of this as.

[0008] Then, a recording rate is a high speed, and it is possible to change a price setup to a user according to the rate of printing, and this invention aims at offering the image formation equipment which can utilize use record as guides, such as a maintenance.

[0009]

[Means for Solving the Problem] In the image formation equipment which the image formation equipment of this invention reads a color picture, and forms the duplicate image of this color picture An output means to separate the color of said color picture and to output the 1st color picture data, A color conversion means to change said 1st color picture data outputted with this output means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, It carries out based on said 2nd color picture data changed with this color conversion means. It carries out based on the consumption of said record material computed with a consumption calculation means to compute the consumption of



said record material, and this consumption calculation means. A costs value calculation means to compute the costs value of said color picture, and an image formation means to form the duplicate image of said color picture based on said 2nd color picture data are provided.

[0010] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads a color picture and forms the duplicate image of this color picture. An output means to separate the color of said color picture and to output the 1st color picture data, A color conversion means to change said 1st color picture data outputted with this output means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, It carries out based on the 2nd color picture data changed with this color conversion means. The consumption of said record material computed with a consumption calculation means to compute the consumption of said record material, and this consumption calculation means It classifies into two or more phases defined beforehand, and a costs value decision means to determine the costs value of said color picture according to the classified phase, and an image formation means to form the duplicate image of said color picture based on said 2nd color picture data are provided.

[0011] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads a color picture and forms the duplicate image of this color picture. An output means to separate the color of said color picture and to output the 1st color picture data, A color conversion means to change said 1st color picture data outputted with this output means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, It carries out based on said 2nd color picture data changed with this color conversion means. A consumption calculation means to compute the consumption of said record material, and the consumption of said record material computed with this consumption calculation means, A costs value calculation means to compute the costs value of said color picture based on a difference with the consumption of the record material of the sepia component obtained based on said 2nd color picture data, and an image formation means to form the duplicate image of said color picture based on said 2nd color picture data are provided.

[0012] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads a color picture and forms the duplicate image of this color picture. An output means to separate the color of said color picture and to output the 1st color picture data, A color conversion means to change said 1st color picture data outputted with this output means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, Thin out said 2nd color picture data changed with this color conversion means, and it carries out based on the 2nd image data which performed this infanticide. It carries out based on the consumption of the record material computed with a consumption calculation means to compute the consumption of said record material, and this consumption calculation means. A costs value calculation means to compute the costs value of said color picture, and an image formation means to form the duplicate image of said color picture-based-on-said-2nd-color-picture-data-are-provided.

[0013] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads a color picture and forms the duplicate image of this color picture. An output means to separate the color of said color picture and to output the 1st color picture data, A color conversion means to change said 1st color picture data outputted with this output means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, It carries out based on said 2nd color picture data changed with this color conversion means. It carries out based on the consumption of said record material



computed with a consumption calculation means to compute the consumption of said record material, and this consumption calculation means. A costs value calculation means to compute the costs value of said color picture, a display means to display the costs value computed with this costs value calculation means, and an image formation means to form the duplicate image of said color picture based on said 2nd color picture data are provided.

[0014] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads a color picture and forms the duplicate image of this color picture. An output means to separate the color of said color picture and to output the 1st color picture data, A color conversion means to change said 1st color picture data outputted with this output means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, It carries out based on said 2nd color picture data changed with this color conversion means. It carries out based on the consumption of said record material computed with a consumption calculation means to compute the consumption of said record material, and this consumption calculation means. A costs value calculation means to compute the costs value of said color picture, and a display means to display the costs value computed with this costs value calculation means, When formation activation directions of a predetermined duplicate image are after the costs value was displayed with this display means, an image formation means to form the duplicate image of said color picture based on said 2nd color picture data is provided.

[0015] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads a color picture and forms the duplicate image of this color picture. An output means to separate the color of said color picture and to output the 1st color picture data, A color conversion means to change said 1st color picture data outputted with this output means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, It carries out based on said 2nd color picture data changed with this color conversion means. It carries out based on the consumption of said record material computed with a consumption calculation means to compute the consumption of said record material, and this consumption calculation means. A costs value calculation means to compute the costs value of said color picture, an addition display means to integrate the costs value computed with this costs value calculation means, and to memorize and display that addition value, and an image formation means to form the duplicate image of said color picture based on said 2nd color picture data are provided.

[0016] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads a color picture and forms the duplicate image of this color picture. An output means to separate the color of said color picture and to output the 1st color picture data, A color conversion means to change said 1st color picture data outputted with this output means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, It carries out based on said 2nd color picture data changed with this color conversion means. It carries out based on the consumption of said record material computed with a consumption calculation means to compute the consumption of said record material, and this consumption calculation means. A costs value calculation means to compute the costs value of said color picture, and said body of equipment are equipped free [ attachment and detachment ], the costs value computed with said costs value calculation means is integrated, and an addition display means to memorize and display the addition value is provided.

[0017] Furthermore, the image formation equipment of this invention is set to the image formation equipment which forms the duplicate image of a color picture sent through a



communication network. A receiving means to receive the 1st color picture data sent through said communication network, A color conversion means to change said color picture data received with this receiving means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, It carries out based on said 2nd color picture data changed with this color conversion means. It carries out based on the consumption of said record material computed with a consumption calculation means to compute the consumption of said record material, and this consumption calculation means. A costs value calculation means to compute the costs value of said color picture, and an image formation means to form the duplicate image of said color picture based on said 2nd color picture data are provided.

[0018] This invention is image formation equipment which sets up a fine claim amount of money to having asked the customer for the fixed amount of money uniformly according to the above-mentioned structure even if image formation of what kind of duplicate image is performed like before. That is, compared with full color printing which used each color record material in plenty, since it computes what amount of record material was used at every image formation and gradual rates are performed based on the amount of this record material, since there is very little consumption of record material, the copy of the manuscript image which most is monochrome and does not spread, for example etc. can enable a setup of a suitable claim amount of money.

[0019] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data. A conversion means to change said 1st color picture data into the 2nd color picture data, An image formation means to form the duplicate image of said 1st color picture using record material based on said 2nd color picture data, A means to compute the consumption of said record material from said 2nd color picture data, A means to compute the costs value of the duplicate image of said 1st color picture based on said computed consumption, It is image formation equipment characterized by providing a means to compute a statistics processing result by carrying out statistics processing of said costs value, and a means to transmit said statistics processing result to an external device through a public line.

[0020] This invention offers the image formation equipment which it does not remain for setting up the claim amount of money to an only proper customer, but record material carries out consumption data statistics processing, and supplies outside using a public line etc., utilizes this, and enables rationalization of activities, such as a maintenance, according to the above-mentioned structure.

[0021] That is, the consumption of record material is recorded according to the above-mentioned structure, and a statistical data is created by the statistical procedure based on this consumption. And an operator becomes possible [ referring to the consumption condition of monthly record material from this personal computer etc. ] in the cases, such as a maintenance, by supplying this statistical data to equipments, such as the exterior, for example, a personal computer, and a database. By carrying out like this, maintenance business, such as exchange of record material which was being done uniformly conventionally, also becomes possible [ improving to what / according to consumption extent of actual record material / is efficient and rational ].

[0022] Moreover, in the image formation equipment which the image formation equipment of this invention reads the 1st color picture data, and forms the duplicate image of said 1st color picture data, said transmitting means is image formation equipment according to claim 10 characterized by transmitting the count of the image formation counted for every phase of this when classifying the consumption of said record material into two or more steps.



[0023] Moreover, in the image formation equipment which the image formation equipment of this invention reads the 1st color picture data, and forms the duplicate image of said 1st color picture data, said transmitting means is image formation equipment according to claim 10 characterized by transmitting the count of the image formation counted to fixed time amount for every phase of this when classifying the consumption of said record material into two or more steps.

[0024] Moreover, in the image formation equipment which the image formation equipment of this invention reads the 1st color picture data, and forms the duplicate image of said 1st color picture data, said transmitting means is image formation equipment according to claim 10 characterized by transmitting the count of the image formation counted to fixed time amount for every phase of this when classifying the consumption of said record material into two or more steps.

[0025] this obtains the copy number-of-sheets data to manuscript classification, such as a color/monochrome, -- having -- lease -- the claim of a NABURU copy tariff is attained. Moreover, since data are changed into a statistic, there are few amounts of the data to transmit, it ends, and a circuit time and dues decrease.

[0026] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data. A conversion means to change said 1st color picture data into the 2nd color picture data, An image formation means to form the duplicate image of said 1st color picture using record material based on said 2nd color picture data, It is image formation equipment characterized by providing a means to compute the consumption of said record material from said 2nd color picture data, a means to compute a statistics processing result by carrying out statistics processing of said costs value, and a means to display said statistics processing result.

[0027] A display of the statistical information about the amount of consumption of an article of consumption is enabled by this, and the article-of-consumption toner of four colors can be supplied the neither more nor less.

[0028] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data. A conversion means to change said 1st color picture data into the 2nd color picture data, An image formation means to form the duplicate image of said 1st color picture using record material based on said 2nd color picture data, It is image formation equipment characterized by providing a means to compute the consumption of said record material from said 2nd color picture data, a means to compute a statistics processing result by carrying out statistics processing of said consumption, and a means to transmit said statistics processing result to an external device through a public line.

[0029] This utilizes for maintenance stage decision the information on the amount of consumption of the article of consumption transmitted to the external device, and the article-of-consumption toner of four colors can be supplied timely the neither more nor less.

[0030] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data. A conversion means to change said 1st color picture data into the 2nd color picture data, An image formation means to form the duplicate image of said 1st color picture using record material based on said 2nd color picture data, It is image formation equipment characterized by providing a means to compute the consumption of said record material from said 2nd color picture data, a means to compute the statistics processing result for every fixed



time amount by carrying out statistics processing of said consumption, and a means to display said statistics processing result.

[0031] A display of the consumption accumulation value for every fixed time amount of an article of consumption is enabled by this, a user's time band is avoided, and a maintenance time zone can be chosen.

[0032] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data. A conversion means to change said 1st color picture data into the 2nd color picture data, An image formation means to form the duplicate image of said 1st color picture using ~~record material based on said 2nd color picture data, It is image formation equipment~~  
~~characterized by providing a means to compute the consumption of said record material from~~ said 2nd color picture data, a means to compute the statistics processing result for every fixed time amount by carrying out statistics processing of said consumption, and a means to transmit said statistics processing result to an external device through a public line.

[0033] This is enabled to utilize for maintenance stage decision the information on the amount of consumption for every fixed time amount of the article of consumption transmitted to the external device.

[0034] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data. A conversion means to change said 1st color picture data into the 2nd color picture data, An image formation means to form the duplicate image of said 1st color picture using record material based on said 2nd color picture data, A means to compute the consumption of said record material from said 2nd color picture data, It is image formation equipment characterized by providing a means to compute the statistics processing result of having carried out statistics processing of the count of the image formation counted for every phase of this when classifying said consumption into two or more steps, and a means to display said statistics processing result.

[0035] Thereby, the display of the consumption accumulation value for every fixed time amount of an article of consumption can be enabled for every at least 2 or more kinds of manuscript class exception.

[0036] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data. A conversion means to change said 1st color picture data into the 2nd color picture data, An image formation means to form the duplicate image of said 1st color picture using record material based on said 2nd color picture data, A means to compute the consumption of said record material from said 2nd color picture data, It is image formation equipment characterized by providing a means to compute the statistics processing result of having carried ~~out statistics processing of the count of the image formation counted for every phase of this when~~  
~~classifying said consumption into two or more steps, and a means to transmit said statistics~~ processing result to an external device through a public line.

[0037] Thereby, the information on the amount of consumption for every fixed time amount of the article of consumption for every manuscript class transmitted to the external device is utilizable for maintenance stage decision.

[0038] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data. A conversion means to change said 1st color picture data into the 2nd color picture



data, An image formation means to form the duplicate image of said 1st color picture using record material based on said 2nd color picture data, It is image formation equipment characterized by providing a means to compute the consumption of said record material using a formula from said 2nd color picture data, and a means to change the parameter of said formula by actuation from the outside.

[0039] Thereby, modification of the setting approach of a costs value can be enabled for every dealer, every dealer, and every user.

[0040]

[Embodiment of the Invention] Hereafter, the example of this invention is explained with reference to a drawing.

[0041] Drawing 1 shows the configuration of the image formation equipment of this example roughly. It is a CCD scanner etc., and the color picture read station 1 changes body light into the electrical signal according to the three primary colors of the light of R (red), G (Green), and B (blue) for every unit pixel which divided the color picture used as a manuscript in all directions, and is 8-bit digital data, i.e., the thing outputted as 1st color data R, G, and B, respectively, respectively for every pixel.

[0042] The color transducer 2 changes and outputs the 1st color data of 8 bits each of RGB inputted for every pixel to the 2nd color data Y, M, C, and K equivalent to the amount of the color material (record material) of Y (yellow), M (Magenta), C (cyanogen), and K (black) which are the three primary colors of ink which is 8-bit data, respectively.

[0043] The color picture Records Department 3 makes YMCK each color material of the amount according to the 2nd color data Y, M, C, and K adhere to a form, and does a hard copy output.

[0044] On the other hand, the 2nd color data Y, M, C, and K is led to the article-of-consumption calculation section 4, and the amount of the article of consumption for color picture 1 screen (color material, i.e., ink) is computed.

[0045] Based on the amount of the article of consumption for one screen of color material YMCK, the costs value calculation section 5 outputs two or more steps of costs values (the so-called amount billed to a customer) according to the costs value ratio set up beforehand.

[0046] A display 6 is the liquid crystal panel installed on the control panel for users which this equipment does not illustrate, or an LED (issue diode) array, and displays a costs value.

[0047] The copy counter 7 combines drops, such as the number machine of mechanical tachometers or nonvolatile memory, liquid crystal, etc. which were installed on a control panel or in the interior of equipment, whenever it carries out the hard copy output of one sheet at the color picture Records Department 3, according to the costs value, advances enumerated data and goes.

[0048] If the key counter 8 is a removable counter, and combines drops, such as the same number machine of mechanical tachometers or nonvolatile memory as the copy counter 7, and liquid crystal, to this equipment, equipment is equipped with it and a hard copy output is made from the color picture Records Department 3, enumerated data will advance according to the costs value.

[0049] Next, the color transducer 2 is explained with reference to drawing 2.

[0050] A masking equation is used as the approach of color correction processing in which the data R, G, and B of three-primary-colors RGB of the light obtained from the color picture read station 1, i.e., the 1st color data, are generally changed into the data y (yellow), m (Magenta), and c (cyanogen) of the ink which controls the amount of color material of a color recording apparatus in three primary colors. The basic type is expressed by the one following.

[0051]



[Equation 1]

[0052] Here, the amount of electrical signals of each color material y, m, and c from which y, m, and c are obtained as a result of masking (it is called chrominance signals y, m, and c, respectively.), the amount of electrical signals of RGB according [ R, G, and B ] to color separation, and A1J are multipliers which show the amount of masking. Fundamentally, a masking circuit is constituted based on this several 1. The example shows drawing 2 . The 1st color data of RGB is inputted into Multipliers 10a, 10b, and 10c, respectively, and multiplication is carried out to a coefficient A 11, and A12 and A13, respectively.

[0053] Next, each multiplication result of Multipliers 10a and 10b is inputted into adder 11a, respectively, and both are added. And in adder 11b, the multiplication result of multiplier 10c and the addition result of adder 11a are added, and the addition result is outputted as a chrominance signal c.

[0054] The multiplication of a coefficient A 21, and A22 and A23 is carried out to the 1st color data of RGB similarly inputted into Multipliers 10d, 10e, and 10f, respectively, the multiplication result of Multipliers 10d and 10e is added by adder 11c, the addition result and the multiplication result of 10f of multipliers are added by 11d of adders, and a chrominance signal m is outputted from 1d of adders.

[0055] a coefficient A 31, and A32 and A33 -- multiplication is carried out, respectively, a Multipliers [ 10g and 10h ] multiplication result is added by adder 11e, the addition result and the multiplication result of multiplier 10i are added by 11f of adders, and a chrominance signal y is outputted from 11f of adders. [ furthermore, ] [ the 1st color data of RGB inputted into Multipliers 10g, 10h, and 10i, and ]

[0056] On the other hand, in the case of color picture formation, the substrate removal UCR (Under Color Removal) is used for reducing the consumption of color material for the purpose. If the principle is explained briefly, paying attention to sepia, i.e., black, being obtained in each color material y, m, and c at the time of tales-doses \*\*\*\*\*, the minimal dose will be calculated among each of each color material y, m, and c, and let it be the consumption of color-material black. That is, when the 2nd color data K equivalent to the consumption of black is defined, it can express with a degree type.

[0057]

$K = \text{MIN}(y, m, c) \text{ -- (1)}$

MIN: The color data of considerable \*\*\*\* 2 can be expressed with a degree type to the function operation which obtains the minimum value, consequently the consumption of each color material of y, m, and c by removing the black component of the constant rate which can be found by (1) formula from each consumption.

[0058]

$Y = y - K \text{ -- (2)}$

$M = m - K \text{ -- (3)}$

$C = c - K \text{ -- (4)}$

That is, by using a black (K) component, the amount of laps of color material is lessened and the consumption of each color material can expect effectiveness, such as reduction.

[0059] The black component of a constant rate is removed from such chrominance signals y, m, and c, and the example of a UCR circuit of performing UCR processing which reduces each amount of signals is shown in drawing 3 .



[0060] In drawing 3, the size of the value is compared by comparator 12a, and a chrominance signal c and a chrominance signal m output the signal (it is 0 if for example, the chrominance signal c is small) of the result to selector 13a.

[0061] A chrominance signal c and a chrominance signal m are inputted into the input port P0 and P1 of selector 13a, respectively, input port (if c is small, it is input port P0) is chosen as it with the control signal (it is 0 if c is small) from comparator 12a, and the signal is outputted to it. This output signal OUTP  $OUTP = \text{MIN}(c, m)$  -- (5)

It becomes.

[0062] It is that output signal OUTK by similarly, inputting this Signal OUTP and chrominance signal y into comparator 12b, and inputting the control signal of that result into selector 13b, and inputting Signal OUTP and a chrominance signal y into the input port P2 and P3 of selector 13b, respectively.  $OUTK = \text{MIN}(y, m, c)$  -- (6)

The 2nd color data k which is the digital signal of a next door and the amount of components of black is obtained.

[0063] Furthermore, a chrominance signal y and the 2nd chrominance signal K are inputted into subtractor 14a, and the 2nd color data Y is obtained by subtraction which deducts the amount k of signals from the amount y of signals. The 2nd color data K is similarly subtracted from a chrominance signal m by subtractor 14b, the 2nd color data M subtracts the 2nd color data K from a chrominance signal c by subtractor 14c, and the 2nd color data C is obtained respectively.

[0064] Next, the article-of-consumption calculation section 4 is explained with reference to drawing 4.

[0065] The 2nd color data Y is inputted into adder 15a with the output of register 16a, those values are added, and it is outputted to register 16a. In case the color picture read station 1 reads color picture 1 screen and begins, the zero clear of the registers 16a, 16b, 16c, and 16d is carried out. Therefore, in register 16a, the 2nd color data Y of the image for one screen is integrated, and the addition color data sigmaY is outputted at the time of reading termination of color picture 1 screen.

[0066] Similarly, the 2nd color data is inputted into adder 15b with the output of register 16b, those values are added, and it is outputted to register 16b, and the 2nd color data M of the image for color picture 1 screen is integrated by register 16b, and addition color data sigmaM is outputted.

[0067] Moreover, the 2nd color data C is inputted into adder 15c with the output of register 16c, those values are added and it is outputted to register 16c, and the 2nd color data C of the image for color picture 1 screen is integrated by register 16c, and addition color data sigmaC is outputted.

[0068] Furthermore, with the output whose 2nd color data K is register 16d, it is inputted into 15d of adders, those values are added and it is outputted to register 16d, and the 2nd color data K of the image for color picture 1 screen is integrated by register 16d, and addition color data sigmaK is outputted.

[0069] When the 2nd color data for 1 pixel of the peak of the 2nd color data is 8 bits noting that the color picture Records Department 3 does hard copy of the color picture to A3 size (297mmx420mm) by 400dpi at this time  $8(\text{bit}) \times 297(\text{mm}) \times 420(\text{mm}) \times \{400(\text{dot}) / 25.4(\text{mm})\}^2 = 2.5 \times 10^8$  -- (7)

It comes out, and since it is, 28 bits is respectively sufficient for Registers [ 16a, 16b, 16c and 16d ] size.

[0070] Next, the costs value calculation section 5 is explained with reference to drawing 5.



[0071] Addition color data  $\sigma Y$  from the article-of-consumption calculation section 4,  $\sigma M$ ,  $\sigma C$ , and four data signals of  $\sigma K$  are inputted into the costs value calculation section 5.

[0072] Addition color data  $\sigma Y$  and  $\sigma M$  are inputted into adder 20a, and the result ( $\sigma Y + \sigma M$ ) of having added the value is outputted to adder 20b.

[0073] In adder 20b, it is further added with the value of addition color data  $\sigma C$ , and the result ( $\sigma Y + \sigma M + \sigma C$ ) is outputted to adder 20c and comparator 21b.

[0074] In comparator 21b, an output value ( $\sigma Y + \sigma M + \sigma C$ ) is compared with the value of  $\sigma K$ , and the result is outputted as a signal CONT1. Namely, signal CONT1  $\sigma Y + \sigma M + \sigma C \geq \sigma K$  -- (8) --

the time of \*\* -- "0" -- outputting --  $\sigma Y + \sigma M + \sigma C \leq \sigma K$  -- (9) --  
"1" is outputted at the time of \*\*.

[0075] In this case, when fulfilling the conditions of a formula (9), the rate of printing of an alphabetic character and a table subject is the smallest, for example, the color picture read by the color picture read station 1 can judge that it is the manuscript of monochrome.

[0076] On the other hand, in adder 20c, an output value ( $\sigma Y + \sigma M + \sigma C$ ) and the value of addition color data  $\sigma K$  are added, and the result ( $\sigma Y + \sigma M + \sigma C + \sigma K$ ) is outputted to comparator 21a.

[0077] The threshold T defined further beforehand is inputted into comparator 21a, an output value ( $\sigma Y + \sigma M + \sigma C + \sigma K$ ) is compared with the value of T, and the result is outputted to logical circuits 22 and 23. Namely, output signal of this comparator 21a  $\sigma Y + \sigma M + \sigma C + \sigma K \geq T$  -- (10)

the time of \*\* -- "0" -- outputting --  $\sigma Y + \sigma M + \sigma C + \sigma K < T$  -- (11)  
"1" is outputted at the time of \*\*.

[0078] At this time, the AND of what carried out logic reversal of the signal CONT1, and the thing which carried out logic reversal of the output signal from comparator 21a is taken, and that result is outputted as a signal CONT3 in a logical circuit 22. namely, signal CONT3  $\sigma Y + \sigma M + \sigma C \geq \sigma K$  it is -- and --  $\sigma Y + \sigma M + \sigma C + \sigma K < T$  -- (12)  
the time of \*\* -- "0" -- outputting --  $\sigma Y + \sigma M + \sigma C \geq \sigma K$  it is -- and --  
 $\sigma Y + \sigma M + \sigma C + \sigma K \geq T$  -- (13)

"1" is outputted at the time of \*\*.

[0079] In this case, when fulfilling the conditions of a formula (13), the color picture read by the color picture read station 1 can judge that it is the full color manuscript of 50% or more of rates of printing, such as a photograph, a printing object, etc. of 50% or more of rates of printing which are represented by natural drawing.

[0080] In a logical circuit 23, the AND of the thing and the output signal from comparator 21a which carried out logic reversal of the signal CONT1 is taken, and the result is outputted as a signal CONT2. namely, signal CONT2  $\sigma Y + \sigma M + \sigma C \geq \sigma K$  it is -- and --  
 $\sigma Y + \sigma M + \sigma C + \sigma K \geq T$  -- (14)

the time of \*\* -- "0" -- outputting --  $\sigma Y + \sigma M + \sigma C \geq \sigma K$  it is -- and --  
 $\sigma Y + \sigma M + \sigma C + \sigma K < T$  -- (15)

"1" is outputted at the time of \*\*.

[0081] In this case, when fulfilling the conditions of a formula (15), the color picture read by the color picture read station 1 can judge that it is the manuscript of the line drawing color whose rate of printing which made the graph and the graphic form the subject is about dozens of %.

[0082] Next, a display 6 is explained. The control panel for a user to input workmanship



instruction is formed in the front face at the image formation equipment of this example, and the display 6 shown in the part at drawing 6 is arranged.

[0083] Three signals of signals CONT1, CONT2, and CONT3 from the costs value calculation section 5 are inputted into a display 6. Each signal is inputted into the LED lighting circuits 30a, 30b, and 30c, and only when each input signal is "1", LED (light emitting diode) 31a, 31b, and 31c is made to turn on. Although the right-hand side of a wavy line N shows the display on a control panel, here To each side side of LED 31a, 31b, and 31c The stickers 33a, 33b, and 33c which printed \*\*\*\* which showed what lighting of each LED would mean are stuck, a sticker 32 is further stuck on these bottoms, and it specifies that a running cost is displayed by LED 31a, 31b, and 31c.

[0084] That is, in a display 6, it indicates that the color picture read by the color picture read station 1 by the signal 1, 2, and CONT 3 is a monochrome manuscript, a line drawing color copy, or a full color manuscript. Thus, a running cost is classifiable into two or more phases (three-stage in this case) with the height of the rate of printing.

[0085] In addition, although the example of an LED display was given here, the display which used the liquid crystal panel is sufficient as an indicator, and even if it displays \*\*\*\* of Stickers 33a, 33b, and 33c, it is not cared about according to a signal 1, 2, and CONT 3.

[0086] Next, the copy counter 7 is explained. This copy counter 7 is contained inside the body of image formation equipment, and the maintainer of equipment etc. usually uses it.

[0087] Drawing 7 shows the configuration of the copy counter 7. The signal 1, 2, and CONT 3 from the costs value calculation section 5 is inputted into a register 40.

[0088] This register 40 is a triplet configuration as shown in drawing 8, and the signal 1, 2, and CONT 3 is assigned to the high order bit, the middle bit, and the lower bit, respectively. If a signal CONT3 is inputted, "4" will be outputted, for example, if a signal CONT2 is inputted, "2" will be outputted, for example, and if a signal CONT1 is inputted, "1" will be outputted, for example.

[0089] The output of a register 40 is inputted and added to an adder 41 with the signal nonvolatile and read from rewritable EEPROM42 electrically, and is again stored in EEPROM42 as a new addition value. Moreover, the addition value is inputted into a liquid crystal display 43, and displays the value.

[0090] Finally, the key counter 8 is explained. The appearance is removable to this equipment with the gestalt of an IC card, as shown in drawing 9. When the body of image formation equipment is inserted and equipped with the key counter 8, the signal 1, 2, and CONT 3 from the costs value calculation section 5 of the body of equipment is inputted into the key counter 8 through the terminal area 50 prepared in the front face of the key counter 8 by exposing. Moreover, the drop 51 is formed in the front face of the key counter 8.

[0091] Drawing 10 shows roughly the configuration of the electric important section of the key counter 8.

[0092] In drawing 10, the signal 1, 2, and CONT 3 inputted from the terminal area 50 is inputted into CPU53 through the interface section 52. Moreover, when the body of image formation equipment is inserted and equipped with the key counter 8, this terminal area 50 serves as the contact for electric power supplies, and can perform the electric power supply to the key counter 8.

[0093] The interface section 52 manages the interface of the body of image formation equipment, and CPU53.

[0094] CPU53 reads the addition value to current [ which has already been memorized by



EEPROM55 ], adds the value according to a signal 1, 2, and CONT 3 to the addition value, and writes the addition value as the result in EEPROM55 again. At this time, the figure pattern equivalent to that addition value is read out of the pattern beforehand registered into PROM54, and it displays on the drop 51 of a liquid crystal panel.

[0095] The program of the copy counter 8 of operation is memorized by PROM54, and CPU53 manages control of the copy counter 8 whole in it according to this program.

[0096] In addition, although the key counter 8 was made into structure without a power source, the mechanical number machine of tachometers is substituted for it, and you may make it display an addition value here, as a cell may be formed in the key counter 8 and the copy counter 7 explained further.--

~~[0097] Drawing 11 is drawing showing the full color recording device concerning this invention.~~

[0098] In this drawing, the photo conductor drum 301 as image support is formed, and it rotates counterclockwise.

[0099] Around the photo conductor drum 301, the electrification machine 302, the 1st development counter 309, the 2nd development counter 310, the 3rd development counter 311, the 4th development counter 312, the front [ cleaning ] electric discharge machine 313, the photo conductor cleaner 314, and the imprint drum 315 as an imprint material base material are arranged.

[0100] As shown in drawing 5 , there is the exposure section 303 which consists of the polygon mirror 307 which scans the laser beam from semiconductor laser (laser diode) 345,346, the polygon motor 308 which drives this polygon mirror 307, a half mirror 347 and a lens (not shown), and a mirror 304,305 in the question of the electrification machine 302 and the 1st development counter 309.

[0101] Development counters 309-312 develop the electrostatic latent image on the photo conductor drum 301 with the toner (developer) with which four colors differ, respectively (visualization), in a Magenta and the 2nd development counter 310, cyanogen and the 3rd development counter 311 possess Hierro, and, as for the 1st development counter 309, the 4th development counter 312 possesses the toner of black.

[0102] The photo conductor drum 301 uniformly charged in the front face with the electrification vessel 302 is exposed by the above-mentioned exposure section 303 therefore scanned by image data, and an electrostatic latent image is formed. After this electrostatic latent image is developed by the development counters 309-312 corresponding to said image data, the sequential imprint of it is carried out by operation of the imprint electrification machine 17 at the form as imprint material by which the imprint drum 315 was adsorbed electrostatic. After the non-imprinted toner on the photo conductor drum 301 is discharged with the electric discharge vessel 313 before cleaning, it is cleaned by the photo conductor cleaner 314. On the other hand, . to which a form is sent out with the feed roller 324, and ready grade is once carried out with the resist roller 325 from a cassette 323, and a form are sent with the resist roller 325 towards the adsorption roller 326 and the adsorption zone electrical machinery 316 which were prepared in the location corresponding to the adsorption location of the imprint drum 315, and the adsorption zone electrical machinery 316 adsorbs electrostatic on the imprint drum 315.

[0103] When performing imprint electrification multicolor printing prepared in after that and the location which counters the photo conductor drum 301 as mentioned above, the above-mentioned development process and an imprint process are repeated to a maximum of 4 times. The separation section 327 dissociates from the imprint drum 315, and the form with which the toner was imprinted is discharged by the tray 331 through the conveyance belt 328,329 and the



fixing section 330 by it in order.

[0104] Moreover, drawing 12 is drawing showing the full color recording device concerning this invention.

[0105] The recording devices 403Y, 403M, and 403C which record the image of four colors of yellow (Y), a Magenta (M), cyanogen (C), and black (BK) as the body 401 of equipment will be in the photo conductor drums 402Y, 402M, and 402C, and 402BK and the parallel condition as image support to the interior, and 403BK are arranged among drawing 12. Since each recording devices 403Y, 403M, and 403C and 403betaK have the respectively same composition, they explain only recording device 3Y of the yellow arranged at the preceding paragraph, attach the suffix which shows the same sign and same color as the same part about other recording devices 403M and 403C and 403BK, and omit explanation. The above-mentioned recording device 403Y is prepared corresponding to photo conductor drum 402Y and this, and has image formation means 404Y for repeating and forming a yellow image on photo conductor drum 402Y. Image formation means 404Y consists of electrification equipment 405Y, aligner 406Y, developer 407Y, cleaning equipment 408Y, electric discharger 409Y, etc.

[0106] Moreover, the imprint conveyance belt 420 as an imprint material conveyance means is stretched, and the lower part of each above-mentioned recording devices 403Y, 403M, and 403C and the arrangement location of 403BK conveys the imprint material 410, such as a form, to said photo conductor drums 402Y, 402M, and 402C and 402betaK.

[0107] furthermore, in the location which counters said photo conductor drums 402Y, 402M, and 402C and 402Bkappa The imprint conveyance belt 420 is inserted. Imprint equipment 421Y as a transfer means, 421M, 421C, and 421BK are arranged, and M, 402C, and the toner image of each color formed in 402betaK are imprinted on the above-mentioned photo conductor drum 402Y and 402 imprint material 410 conveyed with the conveyance belt 420. The above-mentioned imprint material 410 takes timing, and is supplied by the feed system 422 on the conveyance belt 420.

[0108] the delivery roller pair to which the above-mentioned feed system 422 conveys the pickup roller 423 which takes out the imprint material 410 from a sheet paper cassette 419, and the imprint material 410 taken out with this pickup roller 423 as shown in drawing 12 -- the resist roller pair which takes and sends in timing while performing tip ready grade of the imprint material 410 conveyed by 424 and this delivery roller pair 424 -- it consists of 425.

[0109] The flow velocity of the imprint material 10 by above-mentioned resist roller pair 425 and said above-mentioned imprint conveyance belt 420 is set up so that it may become the peripheral speed of the photo conductor drums 402Y, 402M, and 402C and 402betaK, and uniform velocity.

[0110] moreover -- the imprint material conveyance direction (left in drawing) by above-mentioned imprint \*\*\*\*\* RUTO 420 -- an anchorage device 426 and a delivery roller pair -- sequential arrangement of 427 and the paper output tray 428 is carried out, and the control section 50 which performs motion control of the equipment of each recording devices 403Y, 403M, and 403C, 403BK, the feed system 422, and others is formed in the inner pars basilaris ossis occipitalis of the above-mentioned body 401 of equipment.

[0111] When color picture formation is specified from the actuation input section which carries out a deer and which is not illustrated, each recording devices 403Y, 403M, and 403C of IE opening - (Y), a Magenta (M), cyanogen (C), and black (BK) and 403betaK operate to predetermined timing, and the toner image of each color is formed on each photo conductor drums 402Y, 402M, and 402C and 402BK.



[0112] That is, if recording device 403Y is taken for an example, while photo conductor drum 402Y rotates in the direction of the clockwise rotation in drawing (the direction of arrow-head A), the front face will be uniformly charged by electrification equipment 405Y. Subsequently, on this photo conductor drum 402Y charged uniformly, exposure actuation by aligner 406Y is performed, and the latent image corresponding to a yellow image is formed. When this latent image counters developer 7Y, a toner will be supplied and developed and a yellow toner image will be formed on photo conductor drum 402Y.

[0113] In addition, in the recording devices 403M and 403C of other colors, and 403BK, a toner image will be formed similarly. on the other hand, synchronizing with formation actuation of this toner image, the imprint material 10 takes out from a sheet paper cassette 419 -- having -- a resist roller pair -- after carrying out ready grade of the tip by 425, the imprint material 10 is sent in on the imprint conveyance belt 420.

[0114] the imprint material 410 sent in on the imprint conveyance belt is conveyed along with transit of the imprint conveyance belt 420, after the imprint conveyance belt 420 has been adsorbed electrostatic by the adsorption roller 429 as an adsorption means -- having -- first -- a yellow toner image imprint location -- namely, -- that is, it is sent into the location where photo conductor drum 402Y and imprint equipment 421Y oppose on both sides of the imprint \*\*\*\* belt 420.

[0115] While the yellow toner image on photo conductor drum 402Y will be touched the imprint material 410 in this yellow toner image imprint location, therefore, the yellow toner image on imprint equipment 421Y is imprinted by work of imprint equipment 421Y on the imprint material 10.

[0116] The above-mentioned imprint equipment 421Y is constituted by the imprint roller which has half-conductivity, and supplies the electric field which have the potential and reversed polarity of the yellow toner image which has adhered to photo conductor drum 2Y electrostatic from the background of the conveyance belt 20. This electric field act on the yellow toner image on photo conductor drum 402Y through the conveyance belt 402 and the imprint material 410, and, as a result, a yellow toner image is imprinted by the imprint material 10 from photo conductor drum 2Y.

[0117] The above-mentioned imprint equipment 421Y is constituted by the imprint roller which has half-conductivity, and supplies the electric field which have the potential and reversed polarity of the yellow toner image which has adhered to photo conductor drum 2Y electrostatic from the background of the conveyance belt 20. This electric field act on the yellow toner image on photo conductor drum 402Y through the conveyance belt 402 and the imprint material 410, and, as a result, a yellow toner image is imprinted by the imprint material 10 from photo conductor drum 2Y.

[0118] Thus, subsequently to the toner image imprint location of each recording apparatus of Magenta recording apparatus 403M, cyanogen recording apparatus 403C, and black recording apparatus 403betaK sequential conveyance of the imprint material 10 by which the yellow toner image was imprinted is carried out, the sequential imprint of a Magenta toner image, a cyanogen toner image, and the black toner image is carried out, and a color picture is formed.

[0119] the delivery roller pair after the imprint material 410 in which the color toner image was formed subsequently exfoliated from the imprint conveyance belt 420, and was sent into the anchorage device 426 and permanent fixing of a color toner image which carried out the color pile was performed -- it is taken out by the paper output tray 428 through 427.

[0120] On the other hand, the rotation drive of the imprint conveyance belt 420 with which



imprint material exfoliated is carried out as it is, a residual toner and paper powder are cleaned by belt chestnut-NINGU equipment 431, and, subsequently surface potential is fixed with the electric discharge roller 430.

[0121] Moreover, the rotation drive of the photo conductor drums 402Y, 402M, and 402C after the toner image was imprinted, and the 402BK is carried out as it is, a residual toner and paper powder are cleaned by the cleaning equipments 408Y, 408M, and 408C and 408BK, and, subsequently surface potential is fixed with electric dischargers 409Y, 409M, and 409C and the electric discharge lamp of 409betaK. And it will go into the electrification equipments 405Y, 405M, and 405C and a series of processes of 405betaK again if needed.

~~[0122] In the above, the image formation equipment of a configuration as explained is explained with reference to the flow chart shown in drawing 13 about the processing of operation which is the 1st example.~~

[0123] If the copy initiation switch which a manuscript is set to the color picture read station 1, and is not illustrated is pushed, first, the registers 16a-16d of drawing 4 and the register 40 of drawing 8 will be reset, and all of those values to hold will be set to "0" (S1).

[0124] next, the 1st color data R, G, and B of the color picture read station 1 to a certain unit pixel -- a 8-bit digital signal is inputted each into the color transducer 2 (S2).

[0125] the color transducer 2 shows to drawing 2 -- as -- the 2nd color data R, G, and B -- data 8 bits each -- chrominance signals c, m, and y -- it is changed each into 8-bit data, and is continuously shown in drawing 3 -- as -- the 2nd color data Y, M, C, and K -- it is changed each into 8-bit data, and is outputted to the color picture Records Department 3 and the article-of-consumption calculation section 4 (S3).

[0126] the color picture Records Department 3 -- the 2nd color data Y, M, C, and K -- (S4) which forms a part for color 1 picture dot in record media, such as a form, based on data 8 bits each.

[0127] the 2nd color data Y, M, C, and K sent to the article-of-consumption calculation section 4 on the other hand -- as shown in drawing 4, in Adders 15a, 15b, 15c, and 15d, 8-bit data are added each with the value which Registers 16a, 16b, 16c, and 16d hold, respectively, and are again stored in 16a, 16b, 16c, and 16d (S5).

[0128] The above actuation is performed to all the unit pixels outputted from the color picture read station 1, for example, processing of the following step S3 - step S5 is performed by step S2 to return, the 1st color data R and G of the following unit pixel, and b eight bit data each until image 1 fraction of A3 size is read and completed with an image reader (S6).

[0129] After image 1 fraction is read and completed by the color pixel read station 1, addition color data sigmaY, sigmaM, sigmaC, and sigmaK are outputted to the costs value calculation section 5 from the article-of-consumption calculation section 4 (S7).

[0130] As the costs value calculation section 5 shows to drawing 5, sequential addition of the value of addition color data sigmaY, sigmaM, and sigmaC is carried out by Adders 20a, 20b, and 20c. As the result Moreover (sigmaY+sigmaM+sigmaC+sigmaK) compares comparatively the size of the value of (sigma Y+sigma M+sigma C), and the value of sigmaK by 21b, 21a compares a value and a threshold T comparatively, those results are processed in logical circuits 22 and 23, and a signal 1, 2, and CONT 3 is outputted. In the case of this example, it will be distinguished by the following three-stage if the output value of a signal 1, 2, and CONT 3 is expressed for every classification of a manuscript.

[0131] A) case of a monochrome manuscript or the manuscript near monochrome with little color (sigma Y+sigma M+sigma C) <-- sigmaK It becomes and they are CONT 1= 1, CONT 2=



0, and CONT 3= 0.

[0132] B) color is abundant -- case of the color copy of an alphabetic character or a diagram subject with little [ but ] record area ( $\sigma Y + \sigma M + \sigma C$ )  $\geq \sigma K$  and ( $\sigma Y + \sigma M + \sigma C$ )  $< T$  -- It is set to T and they are CONT 1= 0, CONT 2= 1, and CONT 3= 0.

[0133] C) case of a full color manuscript [ like many natural drawings ] whose color and record area is also ( $\sigma Y + \sigma M + \sigma C$ )  $\geq \sigma K$  and ( $\sigma Y + \sigma M + \sigma C$ )  $\geq T$  -- It is set to T and they are CONT 1= 0, CONT 2= 0, and CONT 3= 1.

[0134] A signal 1, 2, and CONT 3 is outputted to each of the copy counter 7 contained the display 6 installed from the costs value calculation section 5 on the control panel for the users who do not illustrate, and inside the body of image formation equipment, and the key counter 8 with which the body of image formation equipment is equipped by the user in case it is used (S8).

[0135] Now, if a signal 1, 2, and CONT 3 is inputted into a display 6, as shown in drawing 6, the LED lighting circuits 30a, 30b, and 30c will drive, and any one of the LED 31a, 31b, and 31c corresponding to a signal 1, 2, and CONT 3 will light up, respectively. the label 32 written to be "a running cost display" beside this LED group -- and -- "-- label 33a of full color; 4 time" -- "line drawing color : Label 33b of twice" and "standard" label 33c for monochrome: are stuck. the case of above-mentioned C -- "-- full color: -- LED31a to which label 33a of 4 time" was given the case of B) -- "-- diagram color: -- LED31b to which label 33b of twice" was given the case of A) -- "-- monochrome: -- (S9) which indicates that a costs [ manuscript / which LED31c to which label 33c of standard" was given lights up, and is installed in the image read station 1 ] setup according to it is made to a user by the classification of each \*\*\*\*\*.

[0136] In the copy counter 7, a signal 1, 2, and CONT 3 is inputted into a register 40, and the costs values 4, 2, and 1 corresponding to Above A, B, and C are outputted. The value which this costs value was added to the costs value till then already stored in EEPROM42 by the adder 41, consequently was updated is stored again. Moreover, the value stored by this EEPROM42 can be checked with a liquid crystal display 43, in case a maintainer etc. asks a user for a toll (S10).

[0137] On the other hand, in the key counter 8, according to the program memorized by PROM822, the signal 1, 2, and CONT 3 from the costs value calculation section is incorporated by CPU53 through a terminal area 50 and the interface section 52, and after the value is added to the value already written in EEPROM55, it is again stored in EEPROM55. Moreover, the stored value is displayed on a drop 51 (S11).

[0138] The example described above can carry out deformation application in the range which does not deviate from the main point. For example, after showing a user a costs value and obtaining comprehension before carrying out hard copy actuation at the color picture Records Department 3, it is possible to also make actuation start, and it of added value is higher. In this case, it attaches and the following 2nd - the 3rd example explain.

[0139] First, processing of image formation equipment of operation is explained as the 2nd example with reference to the flow chart shown in drawing 14. In addition, the same sign is given to the same part as drawing 13, and only a different part is explained. That is, step S4 of drawing 13 is deleted and processing of step S20 of drawing 14 - step S21 is added between processings of step S9 and step S10.

[0140] Although record (S4) at the color picture Records Department 3 was performed in the 1st example of drawing 13 when it computed the value of addition color data  $\sigma Y$ ,  $\sigma M$ ,  $\sigma C$ , and  $\sigma K$  for every pixel In the 2nd example of drawing 14, the operation of addition



color data  $\sigma_Y$ ,  $\sigma_M$ ,  $\sigma_C$ , and  $\sigma_K$  is completed (S6, S7). A costs value is computed (S8), the actuation which checks the depression of the copy initiation key by the user after LED which shows a costs value by the display 6 on a control panel lights up (S9) is added, and it is considering as what is recorded after the check (S20) (S21).

[0141] Output actuation will be started, after showing the user the costs value and obtaining comprehension of a user by this, before starting actuation of a hard copy output.

[0142] If a means (specifically for example, ROM) to store the 2nd color data Y, M, C, and K is prepared for the color picture Records Department 3 at this time When the 2nd color data Y, M, C, and K is outputted at step S3, it becomes possible to store the 2nd color data for one screen at the color picture Records Department 3, and hard copy can be performed at step S21 based on the 2nd color data accumulated with the are recording means.

[0143] Moreover, if preparing in the color transducer 2 is also possible and the depression of a copy initiation key is checked at step S20, the 2nd color data accumulated with the are recording means of the color transducer 2 is transmitted to the color picture Records Department 3, and such an are recording means is step S21, and can perform hard copy at the color picture Records Department 3.

[0144] Furthermore, it is also possible to establish a means to store the 1st color data R, G, and B in the color transducer 2. In this case, when the 1st color data R, G, and B is outputted to the color transducer 2 at step S2, in the color transducer 2, the 1st color data for one screen is stored. If the depression of a copy initiation key is checked at step S20, the 1st color data accumulated with the are recording means of the color transducer 2 is changed into the 2nd color data, it is transmitted to the color picture Records Department 3, and hard copy can be performed at step S21 at the color picture Records Department 3.

[0145] When the case where the are recording means of the 1st color data is formed in the color transducer 2 is compared with the case where the are recording means of the 2nd above-mentioned color data is prepared for the color transducer 2 or the color picture Records Department 3, since there is less amount of data than the 2nd color data, the 1st color data has the advantage that there is little capacity of the are recording means, and it ends.

[0146] What is necessary is just to perform processing of operation like the flow chart shown in drawing 15, when a means to store the 1st color data or the 2nd color data cannot be established, as mentioned above.

[0147] Next, processing of the image formation equipment in this case of operation is explained [ 3rd ] as an example with reference to the flow chart shown in drawing 15. In addition, the same sign is given to the same part as drawing 14, and only a different part is explained. That is, step S21 of drawing 14 has replaced processing of step S30 - step S32.

[0148] When the depression of a copy initiation key is checked at step S20, the manuscript again set there by the color picture read station 1 will be read, the 1st color data will be outputted (S30), it will change into the 2nd color data by the color transducer 2 (S31), and hard copy will be performed based on the 2nd color data at the color picture Records Department 3 (S32).

[0149] In this case, image reading at the time of costs value calculation of step S1 - step S9 (S2) serves as a PURISU can without an image output (hard copy) substantially. Moreover, since activation of hard copy is almost as possible as the depression of a copy initiation key on real time at the color picture Records Department 3, there are especially no problems, such as the response time.

[0150] Although the costs value was explained as fixed asset to net worth ratio of 1, 2, and 4 to Above A, B, and C, it may enable it to choose realistic to set [ which to be also able to set up



setting up a costs value freely and is easy to be accepted in a user ] up in the above explanation of the 3rd of the 1st - an example.

[0151] For example, in electrophotography method record of 4 ream process which has 4 sets of imaging means which consist of a photo conductor, a development counter, etc. as the color picture Records Department 3, it is thought that only the consumption of the toner which is color material increases, and to monochrome, it is full color, sets up with 10 times twice, in a line drawing color, and considers as a cost setup called basic copy cost + color-material consumption (form + photo conductor etc.). If the basic costs value of b and color-material consumption is set to c for basic costs values, such as a and a photo conductor, the basic costs value of the form in the case of the electrophotography method of only monochrome specifically the case of said A --  $4b$  [, such as a form a+ photo conductor, ]+ color-material consumption  $c=a+4.b+c$  -- the case of said B --  $4b$  [, such as a form a+ photo conductor, ]+ color-material consumption  $2c=a+4b+2c$  -- in the case of said C, a form a+ photo conductor etc. is set to  $4b$ + color-material consumption  $10c=a+4b+10c$ .

[0152] On the other hand, in the electrophotography method record from which a metaphor obtains a color picture by four rotations with one photo conductor as the color picture Records Department 3, there is little consumption of the photo conductor part in monochrome, therefore it becomes a cost setup called basic copy cost (form) + monochrome / color difference Kos + color-material consumption. Specifically, in said A, in the  $b$ + color-material consumption  $c=a+b+c$  above B, such as a form a+ photo conductor, a form a+ photo conductor etc. is set to  $4b$ + color-material consumption  $10c=a+4b+10c$ , such as a form a+ photo conductor, in the case of  $4b$ + color-material consumption  $2c=a+4b+2c$  aforementioned C.

[0153] What is necessary is to write beforehand the above-mentioned costs value setting formula and the value of a, b, and c in PROM54 as the same configuration as the key counter 8 as shown in drawing 10 , and just to calculate the configuration of the drop 6 on a control panel, or the electric important section of the copy counter 7 by CPU53, in setting up such a costs setting approach.

[0154] Furthermore, in the above explanation of the 3rd of the 1st - an example, addition color data are computed by integrating the value of the 2nd [ covering all the pixels inputted into Adders 15a-15d in the article-of-consumption calculation section 4 ] color data. In this case, it does not restrict and the 2nd data inputted into Adders 15a-15d is not made into all pixels, but after thinning out in  $1/n$  as an input in every  $n$  pixels, addition color data  $\sigma_Y$  which is statistically convenient,  $\sigma_M$ ,  $\sigma_C$ , and  $\sigma_K$  can be obtained by  $n$  Doubling a Registers [ 16a-16d ] output. This approach aims at making processing speed ease and managing the software processing by CPU. In addition, 8 and 16 grades can be considered as a value of  $n$ .

[0155] Next, the 4th example is explained. Drawing 16 is what showed roughly the configuration of the image formation equipment applied [ 4th ] to an example, gives the same sign to the same part as drawing 1 , and explains only a different part. That is, the color picture read station 1 of drawing 1 has replaced the color picture input interface section 40.

[0156] In drawing 16 , the color picture input interface section 45 consists of the network controller 41 shown in drawing 17 , and an image memory 42, receives the color picture data transmitted from networks, such as colors FAX and LAN, by the network controller, and after it performs predetermined transform processing etc., it stores them in an image memory 42 here.

[0157] Any, such as XYZ of  $L^* a^* b^*$  of three-primary-colors RGB of light and uniform color space and a chromaticity display, are sufficient as this color picture data. Since an image memory 42 becomes the minimum configuration for it to be error diffusion data binary [ for



covering a pixel partially by the dot of single concentration, and performing a concentration display especially ] etc., it is desirable.

[0158] The color transducer 2 carries out color conversion through chrominance signals c, m, and y at the 2nd color data Y, M, C, and K from 3 sets of color picture data from the color picture input interface section 40. Namely, what is necessary is to transpose RGB of the several 1 right-hand side to 3 sets of color picture data, and just to select matrix coefficient A 11-A33. In addition, other configurations are the same as that of the 1st example.

[0159] As explained, according to the above 1st - the 4th example, the color copy set by the color picture read station 1 is read. As mentioned above, the 1st color data R G and B are outputted and it changes into the 2nd color data Y, M, C, and K corresponding to the color component of actual record material by the color transducer 2. Based on the 2nd color data in the article-of-consumption calculation section 4 Compute the consumption of each record material for color picture 1 screen, output as addition color data, and based on the consumption of the record material by the addition color data in the costs value calculation section 5 Classify into the manuscript near monochrome, a line drawing color copy, or a full color manuscript, and a costs value is computed according to the costs value ratio (in the case of the 1st example, it responds to the rate of printing and is 1:2:4) according to the classification. By displaying on a display 6, or the copy counter 7 and the key counter 8 which are also a means for a costs value claim of evidence integrating, and memorizing and displaying the addition value It becomes possible to be able to carry out a costs value setup about the color copy set to the color picture read station 1 according to the consumption (rate of printing) of each record material computed based on the 2nd color data, therefore to change a running cost according to the rate of printing.

[0160] Hereafter, the 5th example of this invention is explained with reference to a drawing.

[0161] Drawing 18 shows the whole this invention configuration concerning the 5th example.

The color picture reading sections 1 are a color scanner, a color camera, etc., and for every unit pixel which divided the color picture used as a manuscript in all directions, body light is changed into the electrical signal according to the three primary colors of the light of R (red), G (Green), and B (blue), and they output it as 8-bit digital data and 1st color data respectively for every pixel. The color transducer 2 changes and outputs the 1st color data of 8 bits each of RGB inputted for every pixel to data of 8 bits each of 2nd color data YMCK equivalent to the amount of the color material of Y (yellow), M (Magenta), C (cyanogen), and K (black) which are the three primary colors of ink. The color picture Records Department 3 makes the color material of YMCK of the amount according to data of 8 bits each of 2nd color data YMCK adhere to a form, and does a hard copy output. On the other hand, data of 8 bits each of 2nd color data YMCK are led to the article-of-consumption calculation section 4, and the amount of the article of consumption for color picture 1 screen is computed. Based on the amount of the article of consumption for one screen of YMCK, the costs value calculation section 5 outputs two or more steps of costs values by the Ruhr set up beforehand. A display 6 is the liquid crystal panel installed on the control panel for users of this equipment, or an LED array, and displays a costs value. The copy counter 7 is the object which combined drops, such as the number machine of mechanical tachometers or nonvolatile memory, liquid crystal, etc. which were installed on a control panel or in the interior of equipment, whenever it carries out the hard copy output of one sheet at the color picture Records Department 3, according to the costs value, advances enumerated data and goes. If a hard copy output is made from the color picture Records Department 3 when the key counter 8 is a removable counter, and is the object which combined drops, such as the same number machine of mechanical tachometers or nonvolatile memory as



the copy counter 7, and liquid crystal, and equipment is equipped with it to equipment, enumerated data will advance according to the costs value.

[0162] Moreover, the amount of the article of consumption for one screen from the article-of-consumption calculation section 4 and the costs value from the costs value calculation section 5 are processed into a statistical data while they are saved in the statistics processing section 9. In the communication link unit 61, the data which controlled the public line network and were stored in the statistics processing section 9 are transmitted. An external device 62 receives and manages the data from a communication link unit.

[0163] Moreover, it connects also with the costs value calculation section 5 directly, and the communication link unit 61 changes the parameter of the operation expression for costs value calculation through a public line 63 from an external device 62. By carrying out like this, modification of the setting approach of a costs value can be enabled from an external device for every dealer, every dealer, and every user.

[0164] First, the color transducer 2 is explained to a detail.

[0165] As the approach of color correction processing in which the data of three-primary-colors RGB of the light obtained from a color picture reader are generally changed into the data ymc of the ink which controls the amount of color material of a color recording apparatus in three primary colors, it is a masking equation.  $|c| = |A11 \ A12 \ A13| \times |R|$   $|m| = |A21 \ A22 \ A23| \times |G|$  (16)  $|y| = |A31 \ A32 \ A33| \times |B|$  is used. Drawing 2 shows the circuitry equivalent to this (16) type. RGB data are inputted into Multipliers 10a, 10b, and 10c, respectively, and multiplication is carried out to a coefficient A 11, and A12 and A13, respectively. Next, each multiplication result of Multipliers 10a and 10b is inputted into adder 11a, respectively, and both are added. And in an adder 214, the multiplication result of multiplier 10c and the addition result of adder 11a are added, and the addition result is outputted as c data. y data are outputted from 11f of adders with the RGB data with which m data were inputted into Multipliers 10g, 10h, and 10i from the adder 215 by the RGB data similarly inputted into Multipliers 11d, 11e, and 10f.

[0166] On the other hand, in the case of color picture formation, the substrate removal UCR (Under Color Removal) is used for reducing the amount of the color material used for the purpose.

[0167]

$K = \text{MIN}(y, m, c)$  (17)

MIN: Each amount of color material which is equivalent to the amount of color material of the K by using K (black) color material asked for the amount used by the function operation which obtains the minimum value  $Y = y - K$   $M = m - K$  (18)

It is reducible like  $C = c - K$ . Drawing 3 shows the configuration of the circuit equivalent to an upper type (17) and (18). The size of the value is compared by comparator 12a, and c data and m data output the signal (it is 0 if c is small) of the result to selector 13a. c data and m data are inputted into input port 0 and 1, respectively, and selector 13a chooses the data (if c is small, it is input port 0) of input port with the control signal (it is 0 if c is small) from comparator 12a, and outputs. This output P data  $P = \text{MIN}(c, m)$  (19)

It becomes. Top-type (18) K data can be obtained in similarly, inputting this P data and y data into comparator 12b, and inputting the control signal and P data, and y data of that result into a selector 232.

[0168] Furthermore, y data and K data are inputted into subtractor 14a, and Y data are obtained by subtraction which deducts K from y. Similarly, M data are obtained from m data and K data by subtractor 14b, and C data are respectively obtained from c data and k data by subtractor 14c.



[0169] Next, the article-of-consumption calculation section 4 is explained to a detail using drawing 4. Y data are inputted and added to adder 15a with the output of register 16a, and are outputted to register 16a. In case the color picture reader 1 reads color picture 1 screen and begins, the zero clear of the register 16a is carried out, and it integrates Y data of the image for one screen, and outputs the value  $\sigma Y$  at the time of reading termination of color picture 1 screen. Similarly, the addition result  $\sigma M$ ,  $\sigma C$ , and  $\sigma K$  are outputted also for M data, C data, and K data from Registers 16b, 16c, and 16d, respectively.

[0170] Noting that the color picture Records Department does hard copy of the color picture to A3 size by 400dpi the maximum amount of data  $8 \times 297 \times 420 \times (400/25.4) \times 2 = 2.5 \times 10^8$  it is -- since, although 28-bits-of-each-are-sufficient-for-Registers-16a, 16b, 16c, and 16d Even-if it does not make Adders [15a, 15b, 15c, and 15d.] input data into all pixels but thins out in  $1/n$  as an input in every  $n$  pixels,  $\sigma Y$  and  $\sigma M$  which are statistically convenient,  $\sigma C$ , and  $\sigma K$  can be obtained by  $n$  Doubling a Registers [16b, 16c, and 16d] output.

[0171] Then, the costs value calculation section 5 is explained to a detail using drawing 19.

[0172]  $\sigma Y$  from the article-of-consumption calculation section,  $\sigma M$ ,  $\sigma C$ , and four values of  $\sigma K$  are inputted into the costs value calculation section. The value of  $\sigma Y$  and  $\sigma M$  is inputted into an adder 501, the added output value ( $\sigma Y + \sigma M$ ) is further inputted and added to an adder 502 with the value of  $\sigma C$ , and the value of ( $\sigma Y + \sigma M + \sigma C$ ) is outputted. This output value ( $\sigma Y + \sigma M + \sigma C$ ) is inputted into a comparator 512 with the value of  $\sigma K$ . Furthermore,  $\sigma K$  is inputted into a comparator 513 with a threshold  $T_2$ . Then, the output of AND gate 524 is a signal  $CONT_0$ ;  
 $\sigma Y + \sigma M + \sigma C < \sigma K$  it is --  $\sigma K \geq T_2$  The time Output 0  $\sigma K < T_2$  The time It becomes an output 1. Printing is almost monochrome and this, i.e.,  $CONT_0$  means, is a case with little consumption of record material. moreover -- next, the output signal  $CONT_1$  of AND gate 523 -- signal  $CONT_1: \sigma Y + \sigma M + \sigma C \geq \sigma K$  The time Output 0  $\sigma Y + \sigma M + \sigma C < \sigma K$  it is --  $\sigma K \geq T_2$  The time It becomes an output 1.

[0173] On the other hand, the value of ( $\sigma Y + \sigma M + \sigma C$ ) and  $\sigma K$  is inputted into an adder 503, and the value of the aggregate value ( $\sigma Y + \sigma M + \sigma C + \sigma K$ ) is outputted and it is inputted into a comparator 511. Another input value of a comparator 511 is threshold  $T$  set up beforehand. the output signal of this comparator 511 --

$\sigma Y + \sigma M + \sigma C + \sigma K \geq T$  The time Output 0  $\sigma Y + \sigma M + \sigma C + \sigma K < T$  The time an output 1 -- with the output signal (signal  $CONT_1$ ) of a comparator 512, the output signal of this comparator 511 has logic reversed, and is inputted into AND element 521. therefore, the output signal of AND element 521 -- signal  $CONT_3: \sigma Y + \sigma M + \sigma C \geq \sigma K$  it is -- and  $\sigma Y + \sigma M + \sigma C + \sigma K < T$  The time Output 0  $\sigma Y + \sigma M + \sigma C + \sigma K \geq T$  The time an output 1 -- further The signal which reversed the logic of the output signal of a comparator 512, and the output signal of a comparator 511 are inputted into AND element 522. the output signal -- signal  $CONT_2: \sigma Y + \sigma M + \sigma C \geq \sigma K$  it is -- and  $\sigma Y + \sigma M + \sigma C + \sigma K \geq T$  The time Output 0  $\sigma Y + \sigma M + \sigma C + \sigma K > T$  The time an output 1 -- it is here and a display 6 is explained. The display 6 which the control panel for a user to input workmanship instruction into a front face is formed, and shows the image formation equipment of this invention to the part at drawing 20 is arranged. Four signals,  $CONT_3$ ,  $CONT_2$ ,  $CONT_1$ , and  $CONT_0$ , are inputted into a display 6 from the costs value calculation section 5. Each signal is inputted into the LED lighting circuits 30a, 30b, 30c, and 30d, and only when each input signal is 1, LED 31a, 31b, 31c, and



30d is made to turn on. Although the right-hand side of a wavy line N shows the display on a control panel, LED [ 31a, 31b, 31c, and 31d ] horizontally the stickers 33a, 33b, 33c, and 33d which printed \*\*\*\* of illustration are stuck, and the sticker 32 is further stuck on the bottom. [0174] In addition, although the example of an LED display was given here, the display which used the liquid crystal panel is sufficient as an indicator, and even if it displays Stickers [ 33a 33b, 33c, and 33d ] \*\*\*\*, it is not cared about according to signals CONT3, CONT2, CONT1, and CONT0.

[0175] Next, the copy counter 7 is explained. Drawing 21 shows the configuration of the copy counter 7. It is put into the signals CONT3, CONT2, CONT1, and CONT0 from the costs value calculation section 5 by the register 40. ~~As this register is shown in drawing 22, signals CONT3, CONT2, CONT1, and CONT0 are assigned to the high order bit, the middle bit, the lower bit, and the last bit by 4 bit patterns, respectively, and if 1 is CONT0 when a signal CONT3 is inputted, an output is CONT2 4 and 2 is CONT1, 0 will be outputted, respectively. This output is inputted and added to an adder 41 with the signal nonvolatile and read from rewritable EEPROM42 electrically, and is again stored in EEPROM42 as a new addition value. Moreover, the addition value is inputted into a liquid crystal display 43, and displays the value.~~

[0176] Then, the key counter 8 is explained. The key counter 8 is removable to this equipment with the gestalt of an IC card. A configuration is shown in drawing 9 . The signals CONT3, CONT2, CONT1, and CONT0 from the costs value calculation section 5 are inputted into CPU53 through a terminal area 50 and the interface section 52. Moreover, this terminal area 50 serves also as the contact for electric power supplies from image formation equipment 10 to the key counter 8. CPU53 applies the aggregate value according to the signals CONT3, CONT2, CONT1, and CONT0 to the old addition value read from EEPROM42, and writes a new addition value in it again at EEPROM55. Furthermore, out of the pattern beforehand registered into PROM54, the figure pattern equivalent to a new addition value is read, and it displays on the drop 51 of a liquid crystal panel. The terminal area 50 and the drop 51 have exposed the appearance of the key counter 8 to the front face of a package 8 like drawing 10 .

[0177] In addition, although considered as the structure which does not have a power source here, a cell may be formed in a key counter, and as the copy counter 7 explained further, a mechanical rotation integrator may be substituted.

[0178] Moreover, drawing of the control panel of the image formation equipment which drawing 33 requires for one example of this invention, and drawing 34 are the block flow diagrams of the control panel of drawing 33 . It is also possible to express a costs value as one of the displays of the liquid crystal screen (LIQUID CRYSTAL DISPLAY) 102 of the control panel 101 which does not form the display 6 ( drawing 1 ) of dedication as a display of a costs value as one modification of this invention, but is contained at the color picture Records Department 3. at this time, the thing of dedication is not prepared, but displaying on the liquid crystal screen 102 also obtains the copy counter 7 and the key counter 8, and they come out of it.

[0179] The control panel 101 has CPU110, PROM111, the gate array 109, the I/F buffer 108, RAM107, the LCD controller driver 106, LCD102, the LED driver 105, LED104, the key switch 103, and touch panel 102 only for panels as an example.

[0180] By these configurations, CPU only for control panels receives the directions which an operator gives through a touch panel 102 and a key switch 103, and this directions information is transmitted to the color picture Records Department 3. Thereby, record of a color picture is performed.

[0181] Moreover, the costs value result from the costs value calculation section 5 and a copy



counter value, and a key counter value are also further displayed on LCD102 through dedication CPU 110.

[0182] Next, the statistics processing section 9 shown in drawing 23 is explained. While the value of  $\sigma_Y$ ,  $\sigma_M$ ,  $\sigma_C$ , and  $\sigma_K$  is inputted from the article-of-consumption calculation section 4, the signal of a costs value is inputted into the statistics processing 9 from the costs value calculation section. Each value is contained by the information memory 910 which consists of EEPROMs with the output value of a timer 901. The main control section 940 operates according to the program memorized by the program memory 920 which is mainly constituted by a microcomputer and its circumference circuit and is constituted by nonvolatile memory. The statistics data memory 930 is memory which stores the data of a result which the main control section 940 processed with the statistics processing program of program memory 950 based on the data which were constituted by rewritable EEPROM and stored in the information memory 910. Such information memory 910, program memory 920, the statistics data memory 930, and a timer 901 are connected with the main control section 940 by the data bus 950, respectively. Moreover, this data bus is connected also with the communication link unit 108.

[0183] The communication link unit 61 shown in drawing 24 is explained. The communications control section 1081 of the communication link unit 61 is connected with the main control section 940 of information storage / processing unit, and transmission and reception of data and transmission and reception of a control signal are performed through a data bus 950. Moreover, the communications control section 1081 is connected with communication link unit 61 memory 930, and the timer 901 is connected with the main control section 940 by the data bus 950, respectively. Moreover, this data bus is connected also with the communication link unit 108.

[0184] The communication link unit 61 shown in drawing 24 is explained. The communications control section 1081 of the communication link unit 61 is connected with the main control section 940 of information storage / processing unit, and transmission and reception of data and transmission and reception of a control signal are performed through a data bus 950. Moreover, the communications control section 1081 is connected to the timer 1082 in the communication link unit 61, the pattern generator 1083, the communication interface 1084, etc. Modulator and demodulator 1085 are connected to the communication interface 1084. Modulator and demodulator 1085 modulate the information on the various data sent from a communication interface 1084, or others to the sound signal of the data format suitable for a transfer, restore to the data further received through the network control section 1086 according to the transmitting format, and send them out to the communications control section 1081 through the communication link interface 1084. Here, the network control section 1086 is for performing a switch of the case where a circuit is used for telebrief, and the case where it is used for data communication, detection of a terminating signal, an auto dial, etc. A timer 82 performs a time check required for the various processings which the communications control section 1081 performs, and also it has a clock function for a communication link, and the processing which performs the communication link of various data or information at the set time amount, for example, the midnight which does not use a circuit for telebrief, is presented with it. The communications control section 1081 to code data are changed into a receipt and the character pattern which is the image data which corresponds this, and a pattern generator 1083 outputs them to a communication interface 1084. Thereby, also when the data transfer point is the device which treats image data like facsimile apparatus, it can respond.

[0185] The external device 62 shown in drawing 25 is explained. Fundamentally, the external



device 62 is constituted by the network control section 1092, modulator and demodulator 1093, and the processor 1094. Through a control device 1094-1, display on the displays 1094-2, such as a CRT display, it prints with the airline printers 1094-3, such as a printer, or modulator and demodulator 1093 store the data received from the public line 63 through the control section 1092 in the storage 1094-4, such as a floppy disk. Moreover, the processor 1094 is equipped with the input units 1094-5, such as a keyboard, for example, can require various data transfers from the communication link unit 61 from an external device 62 side.

[0186] Now, actuation of the image formation equipment which consists of the above configuration is explained using drawing 26.

[0187] If the copy initiation switch which a manuscript is set to the color picture reading section 1, and is not illustrated is pushed, the registers 16a, 16b, 16c, and 16d of drawing 4 and the register 40 of drawing 22 will be reset, and all of those \*\* values will be set to 0 (S51).

[0188] Next, from the color picture reading section 1, digital data of 8 bits each of RGB of a certain unit pixel is inputted into the color transducer 2 (S52). In the color transducer 2, as shown in drawing 2, data of 8 bits each of this RGB are changed into data of 8 bits each of ends cmY, and continuously, as shown in drawing 3, it is changed into data of 8 bit each of YMCK(s), and is outputted to the color picture Records Department 3 and the article-of-consumption calculation section 4 (S53).

[0189] The data of 8 bit each of YMCK(s) sent to the color picture Records Department 3 turn into data which form a part for color 1 picture dot in record media, such as a form, (S54). On the other hand, as shown in drawing 4, Adders 15a, 15b, and 15c and the new value of YMCK are applied to the value currently stored in Registers 16a, 16b, 16c, and 16d by 15d, respectively, and the data of 8 bit each of YMCK(s) sent to the article-of-consumption calculation section 4 are stored in Registers 16a, 16b, 16c, and 16d (S55).

[0190] The above actuation is performed to all the unit pixels outputted from the color picture reading section 1, for example, it returns to step 52 and processing is performed to RGB eight bit data each of the following unit pixel until image 1 fraction of A3 size is read and completed with an image reader (S56).

[0191] After image 1 fraction is read and completed with an image reader, the value of sigmaY, sigmaM, sigmaC, and sigmaK is outputted to the costs value calculation section from the article-of-consumption calculation section 4 (S57). As the costs value calculation section shows to drawing 19, sequential addition of the value of sigmaY, sigmaM, and sigmaC is carried out by adders 501 and 502. The size of a value and the value of sigmaK is compared by the comparator 512. the (sigma Y+sigma M+sigma C) -- Value and threshold T is compared by the comparator 511, the result is processed by the logical element 521,522, and moreover (sigma Y+sigma M+sigma C) outputs a signal to output terminals CONT0, CONT1, CONT2, and CONT3. When the combination makes the classification of a manuscript, and an input signal correspond, it is A monochrome manuscript or a manuscript near monochrome with little color. time there is little consumption-(sigma-Y+sigma-M+sigma C) <= sigmaK-and-- sigmaK <= T2-They are-a ->CONT 0= 1, CONT 1= 0, CONT 2= 0, and CONT3=0B monochrome manuscript or a manuscript near monochrome with little color. When there is fixed consumption (sigma Y+sigma M+sigma C) <= sigmaK -- and -- sigmaK > T2 ->CONT 0= 0, CONT 1= 1, CONT 2= 0, and CONT3=0C color is abundant -- color copy of an alphabetic character with little [ but ] record area, or a diagram subject (sigma Y+sigma M+sigma C) > sigmaK -- and -- (sigma Y+sigma M+sigma C) <= T Full color manuscript [ like many natural drawings ] whose ->CONT 0= 0, CONT 1= 0, CONT 2= 1, and CONT3=0D color and record area is also (sigma



$Y + \sigma M + \sigma C > \sigma K$  -- and --  $(\sigma Y + \sigma M + \sigma C) > T$  They are  $\rightarrow$  CONT 0= 0, CONT 1= 0, CONT 2= 0, and CONT 3= 1. This signal of CONT0, CONT1, CONT2, and CONT3 is outputted to each of the copy counter 7 for service maintenance persons in charge contained inside the display 6 and image formation equipment which were installed on the control panel for users which is not illustrated from the costs value calculation section 5, and the key counter 8 inserted in image formation equipment by the user in case it is used (S58).

[0192] Now, if a signal is inputted into a display 6 from CONT0, CONT1, CONT2, and CONT3, as shown in drawing 20, the LED lighting circuits 30a, 30b, 30c, and 30d will drive, and any one [ LED / 31a 31b, 31c, and 31d / corresponding to CONT0, CONT1, CONT2, and CONT3 ] will light up, respectively. the label 32 written to be "a running cost display" beside this LED group -- and -- "-- label 33a of full color:4 time" -- "line drawing color : Label 33b of twice", "standard" label 33c for monochrome:, "-- monochrome: -- the case where label 33d of smallness" is stuck and it is the above-mentioned A -- "-- LED31a beside label 33a of full color:4 time" the case of B) -- "-- line drawing color: -- LED31b beside label 33b of twice" the case of C) -- "-- monochrome: -- LED31c beside label 33c of standard" the case of D) -- "-- monochrome: -- LED31d of label 33d [ of smallness" ] width lights up, and it indicates that a costs [ manuscript / which is installed in the image reading section ] setup according to it is made to a user by the classification of each \*\*\*\*\* (S59). In the copy counter 7, the signal of CONT0, CONT1, CONT2, and CONT3 is inputted into a register 40, and the costs values 4, 2, 1, and 0 corresponding to Above A, B, C, and D are outputted. This costs value is added to the costs value [ finishing / storing in EEPROM42 ] till then by the adder 711, and the updated value is stored again. Moreover, the value of this EEPROM42 can be checked with a liquid crystal display 43, in case a service maintenance person in charge asks a user for a toll (S60). On the other hand, in the key counter 8, according to the program registered into PROM54, the signal of CONT0, CONT1, CONT2, and CONT3 from the costs value calculation section is incorporated by CPU53 through a terminal area 50 and the interface section 52, and after being added to the value already written in EEPROM42, it is again stored in EEPROM42. Moreover, the stored value is displayed on a drop 51 (S61).

[0193] On the other hand,  $\sigma Y$  from the article-of-consumption calculation section 4,  $\sigma M$ ,  $\sigma C$ , the value of  $\sigma K$ , and the costs value from the costs value calculation section 5 are inputted into the statistics processing section 9, and are stored with the output value which expresses a /part / second with the information memory 910 there at the time of year / moon / day/of a timer 901.

[0194] Drawing 32 is an example which showed the storing gestalt, for example,  $\sigma Y$ ,  $\sigma M$ ,  $\sigma C$ , the value of  $\sigma K$ , 100, 60, 40 and 30, and the costs value 4 are linked to a data number 132 with time amount 95/09/30/16/54/57, and it is stored in it.

[0195] According to the statistics processing program stored in program memory 920, the main control section 940 carries out statistics processing of the data of the information memory 910, and carries out sequential storing at the statistics data memory 930. As one of the statistics processings, the cumulative value of various information is calculated by the following formulas.

[0196]



Here, the cumulative value of all the data stored in information memory is calculated by making into the minimum value 1 of a data number the data number and A in which i was stored by information memory, and making B into the maximum of a data number, i.e., the data number of the newest time of day. This information data is that a serviceman does memory access at the time of a maintenance, and turns into information data corresponding to a maintenance cycle. Here, the accumulating totals of a costs value are called for by transposing to the costs value in which the consumption accumulation value of an article-of-consumption toner, Y accumulating totals, M accumulating totals, C accumulating totals, and K accumulating totals can be found by replacing the part of (X) of a formula (20) with  $\sigma Y$ ,  $\sigma M$ ,  $\sigma C$ , and  $\sigma K$ , and (X) of (20) types is stored by the information memory 910.

[0197] As a statistic of another kind, the accumulation value for every fixed time amount can also be calculated. For example, its attention is paid to the 3rd partition eye of the hour entry stored in the information memory 910. If  $\sigma Y$ ,  $\sigma M$ ,  $\sigma C$ , and  $\sigma K$  and the costs value equivalent to data number i are accumulated about the continuation data in which the 3rd partition has the same value, the cumulative value or costs value accumulating totals of the article-of-consumption toner consumed on the same day can be found. For example, in drawing 32, if the continuation data which have the figure 30 in the 3rd partition of a hour entry are looked for, even data numbers 129-132 will correspond to it, for example, the accumulating totals of the costs value of the day will be set to  $2+2+4+4=12$ . If its attention is similarly paid to the 4th partition of time amount, if its attention is paid to the 2nd partition, it will become the accumulating totals in every hour with monthly accumulating totals. If it divides and accumulates also with the value with the 3rd still more nearly same partition when the 4th partition is larger than 12, and when small, the accumulating totals divided in the morning and the afternoon will be attained.

[0198] Moreover, it can also ask for the copy number of sheets for every fixed time amount according to the class of manuscript. If the hour entry of data numbers 129 and 130 is seen, it is only a part equivalent to the second of the 6th partition, and, as for the difference, amount  $\sigma Y$  of an article-of-consumption toner,  $\sigma M$ ,  $\sigma C$ ,  $\sigma K$ , and a costs value also show the same value. Although this shows that 129 and 130 are the continuation copies by the same manuscript, the data number supports one copy at a time in this way. Then, counting of copy number of sheets becomes possible by carrying out counting of the data number of cases for every value of a costs value about the retrieval of 1 day by day which paid its attention to the 3rd above-mentioned partition of a hour entry. For example, if even the continuation data 129-132 with the figure of 30 of the 3rd partition of the hour entry of drawing 32 are received and counting of the data number of cases for every costs value is carried out, nothing and the costs value 2 will be the forms of two affairs of data numbers 131 and 132 in two affairs of data numbers 129 and 130, and the costs value 4, and counting of the costs value 1 will be carried out according to the costs value with which the copy number of sheets on September 30, 95 corresponds according to the class of manuscript.

[0199] Furthermore, the average can also be calculated as a statistic of another kind. This is called for by doing the division of the various above-mentioned cumulative values with the number of data.

[0200]

Average = accumulating-totals/(B-A) -- Formula (21)

By making the output from a timer 901 into a trigger, for every [ every fixed time amount and ] hour, data processing of these statistics processings is carried out by the main control section



940, and they are stored in the statistics data memory 930 in the form which rewrites data.

[0201] The communication link unit 61 is started with the built-in timer 1082 at every fixed time amount, midnight when 1 time and a communication link tariff will be cheap on 1, and it becomes irregular to the sound signal of the data format which was suitable for the transfer with modulator and demodulator 1085, and it is sent out to a public line 63 through a network control section while it receives the data stored in the statistics data memory 930 through a communication interface 1084. In addition, when proved that it is the device by which a transmitting partner treats image data, such as facsimile, by the network control section, it can change into the character with a pattern generator 1083, and can also output.

[0202] It is received through the network control section 1092 of an external device 62, and this sound signal is changed into the original statistical data by modulator and demodulator 1093, and is stored in a processor 1094 1094-4, for example, storage, such as a floppy disk. Moreover, it is also possible to start data transfer by the data demand from an external device 62. In this case, the demand signal from the processor 1094 of an external device 62 is modulated to a sound signal by modulator and demodulator 1093, and it transmits to a public line 63 through the network control section 1092. The communication link unit 61 restores to the sound signal from a public line 63 by modulator and demodulator 1085 through the network control section 1086, and starts the communications control section through a communication interface. Subsequent data transfer is the same as \*\*\*\*.

[0203] The various statistical datas stored in the processor 1094 of an external device 62 are graph-ized by the data-processing program of a processor 1094, and are outputted to the airline printers 1094-3, such as the displays 1094-2, such as a display, and a printer.

[0204] The case where the monthly copy number of sheets classified by costs value shown in drawing 27 is expressed as a line graph as 1st example of an output is explained. In this example, it turns out that the copy of a full color manuscript [ like a upward tendency, i.e., natural drawing, ] whose copy number of sheets of the costs value 4 is increasing. By the full color copy, there is also much amount of the article of consumption used, and it becomes possible to cope with it from toner scattering within an airframe etc. increasing, before it is better to increase the frequency of a service maintenance and the claim from a user comes. Moreover, the detailed graph for every week can also be created in the form of drawing 27 day by day, and in that case more precise and quick management is attained.

[0205] Moreover, the monthly copy number-of-sheets data for every costs value shown in drawing 27 can be used as data of the copy cost claim to a user. Although the claim amount of money to a user serves as a value which added four sorts of monthly costs values, the bill with which conviction goes can be drawn up by filling in the copy number of sheets for four sorts of every manuscript classification as a detail of the claim. Moreover, by this monthly claim amount of money being obtained, a serviceman cannot visit a user but can also liquidate \*\* using the automatic accounts transfer of a bank account etc. There is little especially copy number of sheets, and when a maintenance is unnecessary, it is effective.

[0206] As 2nd example of an output, every day of the week and the copy number of sheets for every costs value can also be indicated by the bar graph like drawing 28. This graph is utilizable for judging the working day of a service maintenance. Since a user's copying machine use will be interrupted during the activity of a service maintenance, it is necessary to choose few [ a user's operating frequency ] days. In the example of drawing 28, it is not used at all on Saturday and Sunday, and it turns out on Tuesday and Thursday that operating frequency is low. Moreover, when Tuesday is compared with Thursday, even if copy number of sheets is almost the same,



there are many copies of the costs values 2 and 4, i.e., a color copy, on Thursday. With the so-called color copying machine of 4 rotary-system electrophotography record which obtains a color picture by four rotations, the operating time of a copying machine becomes a \*\*\*\*\* from a color copy requiring about 4 times as much time amount as a monochrome copy in that case compared with Tuesday using one photo conductor on Thursday. Therefore, Thursday with little copy number of sheets etc. will be mentioned as a candidate one by one on Tuesday with little operating time of a machine on Saturday which is not used at all and Sunday as a candidate day of the week of a service maintenance.

[0207] On the other hand, the maintenance timing doubled with a user's needs can also be considered. By the copy of a monochrome manuscript, or the copy of the color copy of an alphabetic character / line drawing subject, although the demand about a color tone is not so high, in the case of a copy of a full color manuscript like natural drawing, it cares about a tint in many cases. In the example of drawing 28, in order to concentrate on Friday and to realize color reproduction faithful at the time of these use, Thursday understands that it is desirable to perform a service maintenance for the copy of the full color manuscript equivalent to the costs value 4. Although considered as the one-week display for every day of the week in this example, it is possible similarly to decide monthly maintenance timing similarly as an one-month display for every day by day or half a day.

[0208] As 3rd example of an output, daily article-of-consumption accumulating totals can be displayed by the line graph like drawing 29. This is useful to determining the delivery stage of an article-of-consumption toner. Although the article-of-consumption toner is contained by the cartridge and the bolt and a user and a key operator generally supply it timely, in order to use the toner of four colors, in a color copying machine, four kinds of cartridges and two or more bolts will be reserved. Although copying cannot but become impossible and a serviceman must be called if at least one of them becomes insufficient, it becomes useless [ a tooth space ] to reserve many cartridges and bolts. In the example of drawing 29, since it has supplied two toner bolts each as a reserve at the time of the last service maintenance and K accumulating totals serve as a value near toner 2 duty as of 12 days, it turns out that delivery of K color toner is needed. Moreover, if used at a rate of this as, it can predict having consumed in 2 more - three days. Furthermore, the cumulative value data of other colors are utilizable also as that decision ingredient which should supply the bottle of other colors at the time of the user visit.

[0209] As 4th example of an output, as shown in drawing 35, the amount of consumption of the toner of four colors is displayed according to every month with the bar graph. This is useful to predicting the toner of which is supplied at the time of a visit. Since the consumption of all of the toner of four colors in August is decreasing to abbreviation one half in this example, the supply control of eye bracing of reducing the cartridge of a toner and supply of a bottle by half at the time of a visit of the user before August comes around etc. is possible. Moreover, there is much consumption of K color toner by the monochrome manuscript copy it is guessed that is a sake at the end of a fiscal year in March, and it consumes also twice [ about ] to the order moon. Then, supply control of doubling the cartridge of K color toner and supply of a bottle at the time of the user visit before March comes around is possible. Similarly, September, the cartridge and bottle of a toner of twice [ about ] and K color can supply about 3 times in advance, and the cartridge and bottle of a toner of Y color, M color, and C color can prevent the excess and deficiency of article-of-consumption supply. Therefore, a more efficient service maintenance can be performed by such a graph being obtained.



[0210] In addition, although the data transmitted through a public line 63 were made into the statistical data in which it was stored by the statistics data memory 930 of the statistics processing section 9 in this example The data number in which this was stored by the information memory 910, a hour entry, sigmaY, The statistics processing which was good also as all information data of sigmaM, sigmaC, sigmaK, and a costs value, and was calculated in information storage / processing section in that case The processor 1094 should just be equipped with the configuration realizable [ with the processor 1094 of an external device 62 ], i.e., the thing equivalent to the main control section 940 and program memory 920.

[0211] Moreover, the example described above can carry out deformation application in the range which does not deviate from the main point. For example, after showing a user a costs value and obtaining comprehension before carrying out hard copy actuation, it is possible to also make actuation start, and added value is high. This is realized by the following deformation.

[0212] Although record (S54) at the color picture Records Department 3 was performed in the 1st example of drawing 26 when it computed the value of sigmaY, sigmaM, sigmaC, and sigmaK for every pixel As shown in drawing 30, the operation of sigmaY, sigmaM, sigmaC, and sigmaK is completed (S56, S57). A costs value is computed (S58), the actuation which checks the depression of the copy initiation key by the user after LED which shows a costs value by the display 6 on a control panel lights up (S59) is added, and it is considering as what is recorded after the check (S60) (S61). Output actuation will be started, after showing the user the costs value and obtaining comprehension of a user by this, before starting actuation of a hard copy output. Although S61 can carry out an immediate execute if a means to store the color picture data for one screen in the image recording section 3 is established at this time As shown in drawing 31 to the image recording section 3 without an are recording means, color picture data are received once which will be involved color picture reading section 1 (S102). Changing and (S103) recording on Y, M, C, and K data, (S104) image reading at the time of costs value calculation serves as a PURISU can without an image output substantially.

[0213] It can choose realistic to set [ which to be also able to set up setting up a costs value freely as another modification, and is easy to be accepted in a user ] up.

[0214] The 1st example explained a costs setup as fixed asset to net worth ratio of 1, 2, and 4 to A, B, and C. However, by the so-called 4 ream process electrophotography record which has 4 sets of activity means which consist of a photo conductor, a development counter, etc. as image recording equipment 3, it is thought that only the consumption of the toner which is color material increases.

[0215] Drawing 36 is the table showing the costs value at the time of using 4 rotating-type color picture formation equipment of this invention. furthermore, two kinds such as the thing (0) of the smallness of monochrome, and a criterion (1) -- thinking -- further -- a color line drawing (2) -- full color -- (3) is added and the amount of the toner used in four kinds is examined. 4 times full color [ in twice and a line drawing color (2) ] as an example, when this is made into one unit, having used monochrome smallness-(0) as c for the amount of the toner used at monochrome (1) -- the case of 20 times is shown to drawing 36 by (3). Consequently, if the service labor cost d, Margin e, etc. are included, if it is monochrome (0), costs value (0) = a+b+c+d+e will be calculated as a result, for example. in this case -- it should observe -- in the so-called 4 rotary-system electrophotography record, based on that method, there is little consumption (b) of the photo conductor part in monochrome, and it differs from consumption (4b) of a color. A setup of such a costs value writes the above-mentioned formula for the drop 6 and the copy counter 7 on a control panel in PROM54 beforehand as the same configuration as the key counter 8, and should



just calculate it by CPU53.

[0216] A \*\*\*\* "is contained, as for a photo conductor etc." for a photo conductor drum to be exchanged, a developer, the vertical heating roller for fixing, the blade for cleaning, char DOWAIYA, etc. periodically, and cost is  $\sigma$  (article-of-consumption value / article-of-consumption LIFE) which totaled the value which broke worth of each part article by the LIFE (exchange cycle). Moreover, a "service labor cost" is the value which converted into the cost per sheet the labor cost of the serviceman who requires for routine inspection, failure correction, and an overhaul procedure including exchange of the above-mentioned article of consumption. A "margin" is the value which converted operating profit into the cost per sheet similarly.

~~[0217] Moreover, these values can be changed for every dealer. For this reason, modification of such a value (parameter) is attained from the keyboard 102 of a control panel 101, and 103 grades in inputting a new numeric value if needed.~~

[0218] Moreover, modification of this parameter from external device 62 grade is further attained through a public line 63 using the above-mentioned communication link unit 61.

[0219] Moreover, drawing 37 is the table showing the costs value at the time of using 4 ream type color picture formation equipment of this invention. the case of four rotating types -- the same -- monochrome smallness (0), a monochrome criterion (1), and a color line drawing (2) -- full color -- the amount of the toner used in four kinds of (3) is examined.

[0220] In this case, since the case where it is called little consumption of the photo conductor of monochrome is not applied like [ in the case of four rotating types ], the costs of a photo conductor with all four same kinds are set up.

[0221] In addition, although the cost of a form was also included in the costs value in these examples, when a form is made into an option, only the part a should set up a costs value low.

[0222] Moreover, the method of thinning out and performing the operation of the article-of-consumption calculation section 4 as another modification is also considered. It aims at the amount of an article of consumption making processing speed ease, and substituting it for the software processing by CPU using a rough value being sufficient, to the operation for every unit pixel of Y, M and C which need this for image formation, and K data. There is no need that input data Y, M, C, and K is by all pixels in drawing 4, and infanticide which samples 1 pixel for every 40,000 pixels by about 100 sampling to the amount of data of about 4 M bytes / color if good is statistically possible in the image of A3 size, and the resolution of 400dpi.

[0223] Moreover, in operation of this invention, the configuration of the costs value calculation section 5 is not necessarily a required reason. That is, even when not preparing the configuration of the costs value calculation section 5, it cannot be overemphasized that the image formation equipment which can supply the data which realize the increase in efficiency of for example, maintenance business can be offered by carrying out statistics processing of the amount data of consumption from the article-of-consumption calculation section 4 of a toner in the statistics ~~processing section 9, and transmitting this statistical data outside.~~

~~[0224]~~

[Effect of the Invention] As explained above, according to this invention, the image formation equipment which realizes the database which enables the increase in efficiency of maintenance business etc. can be offered.

[0225] Furthermore, a recording rate is a high speed and the image formation equipment which can set up the invoice price to a user suitably according to the rate of printing can be offered.



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## TECHNICAL FIELD

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[Field of the Invention] This invention relates to the image formation equipment which forms the duplicate image of color pictures, such as a color copying machine.

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## PRIOR ART

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[Description of the Prior Art] Generally, a color copy is roughly classified according to the rate of printing at three sorts. They are three kinds of about 10% of common documents of the photograph and printed matter of 50% or more of rates of printing represented by natural drawing, about dozens of% of presentation data which made the graph and the graphic form the subject, and an alphabetic character and a table subject.

[0003] Conventionally, although there were only a photograph and printed matter when calling it the color copy of personal appearance, PURIZENTESHON data come to be colorized by the appearance of a color personal computer or a color printer, and a color began to be further used from alphabetic character emphasis and a ruled line display of a common document by cheapization of these colors OA equipment. Therefore, the present condition is that the rate of printing of a color copy has been decreasing rapidly.

[0004] Now, the rapidity which can record several [ per minute ] sheets is bought, and the color copying machine which reproduces a color copy has an electrophotography method in use. The running cost is prescribed by the price per sheet, and is unrelated to the height of the rate of printing. Since the rate that having spread for the monochrome alphabetic character manuscript [ being low (several %) ] of the rate of printing and the optical semi-conductor drum of an article of consumption occupy from a short life to a running cost at the beginning was large, the electrophotography copying machine was seldom dependent on the consumption of a toner, and this had become a running cost setup per sheet. Furthermore, since the color copying machine for a color copy has a substantially high rate of printing and there is little total demand of a color toner, the running cost is set up by dozens times the monochrome copying machine.

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## EFFECT OF THE INVENTION

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[Effect of the Invention] As explained above, according to this invention, the image formation equipment which realizes the database which enables the increase in efficiency of maintenance business etc. can be offered.

[0225] Furthermore, a recording rate is a high speed and the image formation equipment which can set up the invoice price to a user suitably according to the rate of printing can be offered.



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## TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] Thus, in the color copying machine by the electrophotography method in which a recording rate has engine performance sufficient as a color copying machine at high speed, the price of the copy per sheet is not concerned with the rate of printing of a color copy, but the color copy with the high rate of printing and the low color copy are prescribed by the fixed price. For this reason, when, reproducing a color copy with the low rate of printing for example, there is a problem that the price to the user more than a substantial running cost will be set up and charged.

[0006] Moreover, also in the color copying machine, the approach of a service maintenance according to every fixed period and copy number of sheets is further adopted like the monochrome copying machine. Although the toner of four colors is used for the color copying machine and four stages also of imaging processes also exist, the frequency where each is used changes greatly with classes of manuscript, and tends to produce excess and deficiency from the class of manuscript being different for every user etc. in an uniform service maintenance. For this reason, there is also a problem that the situation of a useless maintenance or a thoughtless maintenance has occurred.

[0007] Moreover, even if it records use record of the record material by further two or more users on memory etc., it also has the problem that this use record is unutilizable as a guide of a maintenance, in the condition of this as.

[0008] Then, a recording rate is a high speed, and it is possible to change a price setup to a user according to the rate of printing, and this invention aims at offering the image formation equipment which can utilize use record as guides, such as a maintenance.

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## MEANS

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[Means for Solving the Problem] In the image formation equipment which the image formation equipment of this invention reads a color picture, and forms the duplicate image of this color picture An output means to separate the color of said color picture and to output the 1st color picture data, A color conversion means to change said 1st color picture data outputted with this output means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, It carries out based on said 2nd color picture data changed with this color conversion means. It carries out based on the consumption of said record material computed with a consumption calculation means to compute the consumption of said record material, and this consumption calculation means. A costs value calculation means to compute the costs value of said color picture, and an image formation means to form the duplicate image of said color picture based on said 2nd color picture data are provided.

[0010] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads a color picture and forms the duplicate image of this color picture. An output means to separate the color of said color picture and to output the 1st color picture data, A color conversion means to change said 1st color picture data outputted with this output means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, It carries out based on the 2nd color picture data changed



with this color conversion means. The consumption of said record material computed with a consumption calculation means to compute the consumption of said record material, and this consumption calculation means It classifies into two or more phases defined beforehand, and a costs value decision means to determine the costs value of said color picture according to the classified phase, and an image formation means to form the duplicate image of said color picture based on said 2nd color picture data are provided.

[0011] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads a color picture and forms the duplicate image of this color picture. An output means to separate the color of said color picture and to output the 1st color picture data, A color conversion means to change said 1st color picture data outputted with this output means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, It carries out based on said 2nd color picture data changed with this color conversion means. A consumption calculation means to compute the consumption of said record material, and the consumption of said record material computed with this consumption calculation means, A costs value calculation means to compute the costs value of said color picture based on a difference with the consumption of the record material of the sepia component obtained based on said 2nd color picture data, and an image formation means to form the duplicate image of said color picture based on said 2nd color picture data are provided.

[0012] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads a color picture and forms the duplicate image of this color picture. An output means to separate the color of said color picture and to output the 1st color picture data, A color conversion means to change said 1st color picture data outputted with this output means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, Thin out said 2nd color picture data changed with this color conversion means, and it carries out based on the 2nd image data which performed this infanticide. It carries out based on the consumption of the record material computed with a consumption calculation means to compute the consumption of said record material, and this consumption calculation means. A costs value calculation means to compute the costs value of said color picture, and an image formation means to form the duplicate image of said color picture based on said 2nd color picture data are provided.

[0013] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads a color picture and forms the duplicate image of this color picture. An output means to separate the color of said color picture and to output the 1st color picture data, A color conversion means to change said 1st color picture data outputted with this output means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, It carries out based on said 2nd color picture data changed with this color conversion means. It carries out based on the consumption of said record material computed with a consumption calculation means to compute the consumption of said record material, and this consumption calculation means. A costs value calculation means to compute the costs value of said color picture, a display means to display the costs value computed with this costs value calculation means, and an image formation means to form the duplicate image of said color picture based on said 2nd color picture data are provided.

[0014] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads a color picture and forms the duplicate image of this color picture. An output means to separate the color of said color picture and to output the 1st color picture data, A color conversion means to change said 1st color picture data outputted with this output means



into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, It carries out based on said 2nd color picture data changed with this color conversion means. It carries out based on the consumption of said record material computed with a consumption calculation means to compute the consumption of said record material, and this consumption calculation means. A costs value calculation means to compute the costs value of said color picture, and a display means to display the costs value computed with this costs value calculation means, When formation activation directions of a predetermined duplicate image are after the costs value was displayed with this display means, an image formation means to form the duplicate image of said color picture based on said 2nd color picture data is provided.

[0015] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads a color picture and forms the duplicate image of this color picture. An output means to separate the color of said color picture and to output the 1st color picture data, A color conversion means to change said 1st color picture data outputted with this output means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, It carries out based on said 2nd color picture data changed with this color conversion means. It carries out based on the consumption of said record material computed with a consumption calculation means to compute the consumption of said record material, and this consumption calculation means. A costs value calculation means to compute the costs value of said color picture, an addition display means to integrate the costs value computed with this costs value calculation means, and to memorize and display that addition value, and an image formation means to form the duplicate image of said color picture based on said 2nd color picture data are provided.

[0016] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads a color picture and forms the duplicate image of this color picture. An output means to separate the color of said color picture and to output the 1st color picture data, A color conversion means to change said 1st color picture data outputted with this output means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, It carries out based on said 2nd color picture data changed with this color conversion means. It carries out based on the consumption of said record material computed with a consumption calculation means to compute the consumption of said record material, and this consumption calculation means. A costs value calculation means to compute the costs value of said color picture, and said body of equipment are equipped free [ attachment and detachment ], the costs value computed with said costs value calculation means is integrated, and an addition display means to memorize and display the addition value is provided.

[0017] Furthermore, the image formation equipment of this invention is set to the image formation equipment which forms the duplicate image of a color picture sent through a communication network. A receiving means to receive the 1st color picture data sent through said communication network, A color conversion means to change said color picture data received with this receiving means into the 2nd color picture data corresponding to the color component of the record material used for formation of said duplicate image, It carries out based on said 2nd color picture data changed with this color conversion means. It carries out based on the consumption of said record material computed with a consumption calculation means to compute the consumption of said record material, and this consumption calculation means. A costs value calculation means to compute the costs value of said color picture, and an image formation means to form the duplicate image of said color picture based on said 2nd color



picture data are provided.

[0018] This invention is image formation equipment which sets up a fine claim amount of money to having asked the customer for the fixed amount of money uniformly according to the above-mentioned structure even if image formation of what kind of duplicate image is performed like before. That is, compared with full color printing which used each color record material in plenty, since it computes what amount of record material was used at every image formation and gradual rates are performed based on the amount of this record material, since there is very little consumption of record material, the copy of the manuscript image which most is monochrome and does not spread, for example etc. can enable a setup of a suitable claim amount of money.

[0019] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data. A conversion means to change said 1st color picture data into the 2nd color picture data, An image formation means to form the duplicate image of said 1st color picture using record material based on said 2nd color picture data, A means to compute the consumption of said record material from said 2nd color picture data, A means to compute the costs value of the duplicate image of said 1st color picture based on said computed consumption, It is image formation equipment characterized by providing a means to compute a statistics processing result by carrying out statistics processing of said costs value, and a means to transmit said statistics processing result to an external device through a public line.

[0020] This invention offers the image formation equipment which it does not remain for setting up the claim amount of money to an only proper customer, but record material carries out consumption data statistics processing, and supplies outside using a public line etc., utilizes this, and enables rationalization of activities, such as a maintenance, according to the above-mentioned structure.

[0021] That is, the consumption of record material is recorded according to the above-mentioned structure, and a statistical data is created by the statistical procedure based on this consumption. And an operator becomes possible [ referring to the consumption condition of monthly record material from this personal computer etc. ] in the cases, such as a maintenance, by supplying this statistical data to equipments, such as the exterior, for example, a personal computer, and a database. By carrying out like this, maintenance business, such as exchange of record material which was being done uniformly conventionally, also becomes possible [ improving to what / according to consumption extent of actual record material / is efficient and rational ].

[0022] Moreover, in the image formation equipment which the image formation equipment of this invention reads the 1st color picture data, and forms the duplicate image of said 1st color picture data, said transmitting means is image formation equipment according to claim 10 characterized by transmitting the count of the image formation counted for every phase of this when classifying the consumption of said record material into two or more steps.

[0023] Moreover, in the image formation equipment which the image formation equipment of this invention reads the 1st color picture data, and forms the duplicate image of said 1st color picture data, said transmitting means is image formation equipment according to claim 10 characterized by transmitting the count of the image formation counted to fixed time amount for every phase of this when classifying the consumption of said record material into two or more steps.

[0024] Moreover, in the image formation equipment which the image formation equipment of this invention reads the 1st color picture data, and forms the duplicate image of said 1st color picture data, said transmitting means is image formation equipment according to claim 10



characterized by transmitting the count of the image formation counted to fixed time amount for every phase of this when classifying the consumption of said record material into two or more steps.

[0025] this obtains the copy number-of-sheets data to manuscript classification, such as a color/monochrome, -- having -- lease -- the claim of a NABURU copy tariff is attained.

Moreover, since data are changed into a statistic, there are few amounts of the data to transmit, it ends, and a circuit time and dues decrease.

[0026] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data. A conversion means to change said 1st color picture data into the 2nd color picture data, An image formation means to form the duplicate image of said 1st color picture using record material based on said 2nd color picture data, It is image formation equipment characterized by providing a means to compute the consumption of said record material from said 2nd color picture data, a means to compute a statistics processing result by carrying out statistics processing of said costs value, and a means to display said statistics processing result.

[0027] A display of the statistical information about the amount of consumption of an article of consumption is enabled by this, and the article-of-consumption toner of four colors can be supplied the neither more nor less.

[0028] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data. A conversion means to change said 1st color picture data into the 2nd color picture data, An image formation means to form the duplicate image of said 1st color picture using record material based on said 2nd color picture data, It is image formation equipment characterized by providing a means to compute the consumption of said record material from said 2nd color picture data, a means to compute a statistics processing result by carrying out statistics processing of said consumption, and a means to transmit said statistics processing result to an external device through a public line.

[0029] This utilizes for maintenance stage decision the information on the amount of consumption of the article of consumption transmitted to the external device, and the article-of-consumption toner of four colors can be supplied timely the neither more nor less.

[0030] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data. A conversion means to change said 1st color picture data into the 2nd color picture data, An image formation means to form the duplicate image of said 1st color picture using record material based on said 2nd color picture data, It is image formation equipment characterized by providing a means to compute the consumption of said record material from said 2nd color picture data, a means to compute the statistics processing result for every fixed time amount by carrying out statistics processing of said consumption, and a means to display said statistics processing result.

[0031] A display of the consumption accumulation value for every fixed time amount of an article of consumption is enabled by this, a user's time band is avoided, and a maintenance time zone can be chosen.

[0032] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data. A conversion means to change said 1st color picture data into the 2nd color picture data, An image formation means to form the duplicate image of said 1st color picture using



record material based on said 2nd color picture data, It is image formation equipment characterized by providing a means to compute the consumption of said record material from said 2nd color picture data, a means to compute the statistics processing result for every fixed time amount by carrying out statistics processing of said consumption, and a means to transmit said statistics processing result to an external device through a public line.

[0033] This is enabled to utilize for maintenance stage decision the information on the amount of consumption for every fixed time amount of the article of consumption transmitted to the external device.

[0034] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data. A conversion means to change said 1st color picture data into the 2nd color picture data, An image formation means to form the duplicate image of said 1st color picture using record material based on said 2nd color picture data, A means to compute the consumption of said record material from said 2nd color picture data, It is image formation equipment characterized by providing a means to compute the statistics processing result of having carried out statistics processing of the count of the image formation counted for every phase of this when classifying said consumption into two or more steps, and a means to display said statistics processing result.

[0035] Thereby, the display of the consumption accumulation value for every fixed time amount of an article of consumption can be enabled for every at least 2 or more kinds of manuscript class exception.

[0036] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data. A conversion means to change said 1st color picture data into the 2nd color picture data, An image formation means to form the duplicate image of said 1st color picture using record material based on said 2nd color picture data, A means to compute the consumption of said record material from said 2nd color picture data, It is image formation equipment characterized by providing a means to compute the statistics processing result of having carried out statistics processing of the count of the image formation counted for every phase of this when classifying said consumption into two or more steps, and a means to transmit said statistics processing result to an external device through a public line.

[0037] Thereby, the information on the amount of consumption for every fixed time amount of the article of consumption for every manuscript class transmitted to the external device is utilizable for maintenance stage decision.

[0038] Moreover, the image formation equipment of this invention is set to the image formation equipment which reads the 1st color picture data and forms the duplicate image of said 1st color picture data. A conversion means to change said 1st color picture data into the 2nd color picture data, An image formation means to form the duplicate image of said 1st color picture using record material based on said 2nd color picture data, It is image formation equipment characterized by providing a means to compute the consumption of said record material using a formula from said 2nd color picture data, and a means to change the parameter of said formula by actuation from the outside.

[0039] Thereby, modification of the setting approach of a costs value can be enabled for every dealer, every dealer, and every user.

[0040]

[Embodiment of the Invention] Hereafter, the example of this invention is explained with



reference to a drawing.

[0041] Drawing 1 shows the configuration of the image formation equipment of this example roughly. It is a CCD scanner etc., and the color picture read station 1 changes body light into the electrical signal according to the three primary colors of the light of R (red), G (Green), and B (blue) for every unit pixel which divided the color picture used as a manuscript in all directions, and is 8-bit digital data, i.e., the thing outputted as 1st color data R, G, and B, respectively, respectively for every pixel.

[0042] The color transducer 2 changes and outputs the 1st color data of 8 bits each of RGB inputted for every pixel to the 2nd color data Y, M, C, and K equivalent to the amount of the color material (record material) of Y (yellow), M (Magenta), C (cyanogen), and K (black) which are the three primary colors of ink which is 8-bit data, respectively.

[0043] The color picture Records Department 3 makes YMCK each color material of the amount according to the 2nd color data Y, M, C, and K adhere to a form, and does a hard copy output.

[0044] On the other hand, the 2nd color data Y, M, C, and K is led to the article-of-consumption calculation section 4, and the amount of the article of consumption for color picture 1 screen (color material, i.e., ink) is computed.

[0045] Based on the amount of the article of consumption for one screen of color material YMCK, the costs value calculation section 5 outputs two or more steps of costs values (the so-called amount billed to a customer) according to the costs value ratio set up beforehand.

[0046] A display 6 is the liquid crystal panel installed on the control panel for users which this equipment does not illustrate, or an LED (issue diode) array, and displays a costs value.

[0047] The copy counter 7 combines drops, such as the number machine of mechanical tachometers or nonvolatile memory, liquid crystal, etc. which were installed on a control panel or in the interior of equipment, whenever it carries out the hard copy output of one sheet at the color picture Records Department 3, according to the costs value, advances enumerated data and goes.

[0048] If the key counter 8 is a removable counter, and combines drops, such as the same number machine of mechanical tachometers or nonvolatile memory as the copy counter 7, and liquid crystal, to this equipment, equipment is equipped with it and a hard copy output is made from the color picture Records Department 3, enumerated data will advance according to the costs value.

[0049] Next, the color transducer 2 is explained with reference to drawing 2.

[0050] A masking equation is used as the approach of color correction processing in which the data R, G, and B of three-primary-colors RGB of the light obtained from the color picture read station 1, i.e., the 1st color data, are generally changed into the data y (yellow), m (Magenta), and c (cyanogen) of the ink which controls the amount of color material of a color recording apparatus in three primary colors. The basic type is expressed by the one following.

[0051]

[Equation 1]

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[0052] Here, the amount of electrical signals of each color material y, m, and c from which y, m, and c are obtained as a result of masking (it is called chrominance signals y, m, and c, respectively.), the amount of electrical signals of RGB according [ R, G, and B ] to color separation, and A1J are multipliers which show the amount of masking. Fundamentally, a masking circuit is constituted based on this several 1. The example shows drawing 2 . The 1st color data of RGB is inputted into Multipliers 10a, 10b, and 10c, respectively, and multiplication is carried out to a coefficient A 11, and A12 and A13, respectively.

[0053] Next, each multiplication result of Multipliers 10a and 10b is inputted into adder 11a, respectively, and both are added. And in adder 11b, the multiplication result of multiplier 10c and the addition result of adder 11a are added, and the addition result is outputted as a chrominance signal c.

[0054] The multiplication of a coefficient A 21, and A22 and A23 is carried out to the 1st color data of RGB similarly inputted into Multipliers 10d, 10e, and 10f, respectively, the multiplication result of Multipliers 10d and 10e is added by adder 11c, the addition result and the multiplication result of 10f of multipliers are added by 11d of adders, and a chrominance signal m is outputted from 1d of adders.

[0055] a coefficient A 31, and A32 and A33 -- multiplication is carried out, respectively, a Multipliers [ 10g and 10h ] multiplication result is added by adder 11e, the addition result and the multiplication result of multiplier 10i are added by 11f of adders, and a chrominance signal y is outputted from 11f of adders. [ furthermore, ] [ the 1st color data of RGB inputted into Multipliers 10g, 10h, and 10i, and ]

[0056] On the other hand, in the case of color picture formation, the substrate removal UCR (Under Color Removal) is used for reducing the consumption of color material for the purpose. If the principle is explained briefly, paying attention to sepia, i.e., black, being obtained in each color material y, m, and c at the time of tales-doses \*\*\*\*\*, the minimal dose will be calculated among each of each color material y, m, and c, and let it be the consumption of color-material black. That is, when the 2nd color data K equivalent to the consumption of black is defined, it can express with a degree type.

[0057]

$K = \text{MIN}(y, m, c) \text{ -- (1)}$

MIN: The color data of considerable \*\*\*\* 2 can be expressed with a degree type to the function operation which obtains the minimum value, consequently the consumption of each color material of y, m, and c by removing the black component of the constant rate which can be found by (1) formula from each consumption.

[0058]

$Y = y - K \text{ -- (2)}$

$M = m - K \text{ -- (3)}$

$C = c - K \text{ -- (4)}$

That is, by using a black (K) component, the amount of laps of color material is lessened and the consumption of each color material can expect effectiveness, such as reduction.

[0059] The black component of a constant rate is removed from such chrominance signals y, m, and c, and the example of a UCR circuit of performing UCR processing which reduces each amount of signals is shown in drawing 3 .

[0060] In drawing 3 , the size of the value is compared by comparator 12a, and a chrominance signal c and a chrominance signal m output the signal (it is 0 if for example, the chrominance signal c is small) of the result to selector 13a.



[0061] A chrominance signal  $c$  and a chrominance signal  $m$  are inputted into the input port P0 and P1 of selector 13a, respectively, input port (if  $c$  is small, it is input port P0) is chosen as it with the control signal (it is 0 if  $c$  is small) from comparator 12a, and the signal is outputted to it. This output signal  $OUTP = \min(c, m)$  -- (5)

It becomes.

[0062] It is that output signal  $OUTK$  by similarly, inputting this Signal  $OUTP$  and chrominance signal  $y$  into comparator 12b, and inputting the control signal of that result into selector 13b, and inputting Signal  $OUTP$  and a chrominance signal  $y$  into the input port P2 and P3 of selector 13b, respectively.  $OUTK = \min(y, m, c)$  -- (6)

~~The 2nd color data  $k$  which is the digital signal of a next door and the amount of components of black is obtained.~~

[0063] Furthermore, a chrominance signal  $y$  and the 2nd chrominance signal  $K$  are inputted into subtractor 14a, and the 2nd color data  $Y$  is obtained by subtraction which deducts the amount  $k$  of signals from the amount  $y$  of signals. The 2nd color data  $K$  is similarly subtracted from a chrominance signal  $m$  by subtractor 14b, the 2nd color data  $M$  subtracts the 2nd color data  $K$  from a chrominance signal  $c$  by subtractor 14c, and the 2nd color data  $C$  is obtained respectively.

[0064] Next, the article-of-consumption calculation section 4 is explained with reference to drawing 4.

[0065] The 2nd color data  $Y$  is inputted into adder 15a with the output of register 16a, those values are added, and it is outputted to register 16a. In case the color picture read station 1 reads color picture 1 screen and begins, the zero clear of the registers 16a, 16b, 16c, and 16d is carried out. Therefore, in register 16a, the 2nd color data  $Y$  of the image for one screen is integrated, and the addition color data  $\sigma Y$  is outputted at the time of reading termination of color picture 1 screen.

[0066] Similarly, the 2nd color data is inputted into adder 15b with the output of register 16b, those values are added, and it is outputted to register 16b, and the 2nd color data  $M$  of the image for color picture 1 screen is integrated by register 16b, and addition color data  $\sigma M$  is outputted.

[0067] Moreover, the 2nd color data  $C$  is inputted into adder 15c with the output of register 16c, those values are added and it is outputted to register 16c, and the 2nd color data  $C$  of the image for color picture 1 screen is integrated by register 16c, and addition color data  $\sigma C$  is outputted.

[0068] Furthermore, with the output whose 2nd color data  $K$  is register 16d, it is inputted into 15d of adders, those values are added and it is outputted to register 16d, and the 2nd color data  $K$  of the image for color picture 1 screen is integrated by register 16d, and addition color data  $\sigma K$  is outputted.

[0069] When the 2nd color data for 1 pixel of the peak of the 2nd color data is 8 bits noting that the color picture Records Department 3 does hard copy of the color picture to A3 size (297mmx420mm) by 400dpi at this time  $8(\text{bit}) \times 297(\text{mm}) \times 420(\text{mm}) \times \{400(\text{dot}) / 25.4(\text{mm})\}^2 = 2.5 \times 10^8$  -- (7)

It comes out, and since it is, 28 bits is respectively sufficient for Registers [ 16a, 16b, 16c and 16d ] size.

[0070] Next, the costs value calculation section 5 is explained with reference to drawing 5.

[0071] Addition color data  $\sigma Y$  from the article-of-consumption calculation section 4,  $\sigma M$ ,  $\sigma C$ , and four data signals of  $\sigma K$  are inputted into the costs value calculation section 5.



[0072] Addition color data  $\sigma Y$  and  $\sigma M$  are inputted into adder 20a, and the result ( $\sigma Y + \sigma M$ ) of having added the value is outputted to adder 20b.

[0073] In adder 20b, it is further added with the value of addition color data  $\sigma C$ , and the result ( $\sigma Y + \sigma M + \sigma C$ ) is outputted to adder 20c and comparator 21b.

[0074] In comparator 21b, an output value ( $\sigma Y + \sigma M + \sigma C$ ) is compared with the value of  $\sigma K$ , and the result is outputted as a signal CONT1. Namely, signal CONT1  $\sigma Y + \sigma M + \sigma C \geq \sigma K$  -- (8)

the time of \*\* -- "0" -- outputting --  $\sigma Y + \sigma M + \sigma C < \sigma K$  -- (9)  
"1" is outputted at the time of \*\*.

[0075] In this case, when fulfilling the conditions of a formula (9), the rate of printing of an alphabetic character and a table subject is the smallest, for example, the color picture read by the color picture read station 1 can judge that it is the manuscript of monochrome.

[0076] On the other hand, in adder 20c, an output value ( $\sigma Y + \sigma M + \sigma C$ ) and the value of addition color data  $\sigma K$  are added, and the result ( $\sigma Y + \sigma M + \sigma C + \sigma K$ ) is outputted to comparator 21a.

[0077] The threshold T defined further beforehand is inputted into comparator 21a, an output value ( $\sigma Y + \sigma M + \sigma C + \sigma K$ ) is compared with the value of T, and the result is outputted to logical circuits 22 and 23. Namely, output signal of this comparator 21a  $\sigma Y + \sigma M + \sigma C + \sigma K \geq T$  -- (10)

the time of \*\* -- "0" -- outputting --  $\sigma Y + \sigma M + \sigma C + \sigma K < T$  -- (11)  
"1" is outputted at the time of \*\*.

[0078] At this time, the AND of what carried out logic reversal of the signal CONT1, and the thing which carried out logic reversal of the output signal from comparator 21a is taken, and that result is outputted as a signal CONT3 in a logical circuit 22. namely, signal CONT3  $\sigma Y + \sigma M + \sigma C \geq \sigma K$  it is -- and --  $\sigma Y + \sigma M + \sigma C + \sigma K < T$  -- (12)  
the time of \*\* -- "0" -- outputting --  $\sigma Y + \sigma M + \sigma C \geq \sigma K$  it is -- and --  $\sigma Y + \sigma M + \sigma C + \sigma K \geq T$  -- (13)

"1" is outputted at the time of \*\*.

[0079] In this case, when fulfilling the conditions of a formula (13), the color picture read by the color picture read station 1 can judge that it is the full color manuscript of 50% or more of rates of printing, such as a photograph, a printing object, etc. of 50% or more of rates of printing which are represented by natural drawing.

[0080] In a logical circuit 23, the AND of the thing and the output signal from comparator 21a which carried out logic reversal of the signal CONT1 is taken, and the result is outputted as a signal CONT2. namely, signal CONT2  $\sigma Y + \sigma M + \sigma C \geq \sigma K$  it is -- and --  $\sigma Y + \sigma M + \sigma C + \sigma K \geq T$  -- (14)

the time of \*\* -- "0" -- outputting --  $\sigma Y + \sigma M + \sigma C \geq \sigma K$  it is -- and --  $\sigma Y + \sigma M + \sigma C + \sigma K < T$  -- (15)

"1" is outputted at the time of \*\*.

[0081] In this case, when fulfilling the conditions of a formula (15), the color picture read by the color picture read station 1 can judge that it is the manuscript of the line drawing color whose rate of printing which made the graph and the graphic form the subject is about dozens of %.

[0082] Next, a display 6 is explained. The control panel for a user to input workmanship instruction is formed in the front face at the image formation equipment of this example, and the display 6 shown in the part at drawing 6 is arranged.

[0083] Three signals of signals CONT1, CONT2, and CONT3 from the costs value calculation



section 5 are inputted into a display 6. Each signal is inputted into the LED lighting circuits 30a, 30b, and 30c, and only when each input signal is "1", LED (light emitting diode) 31a, 31b, and 31c is made to turn on. Although the right-hand side of a wavy line N shows the display on a control panel, here To each side side of LED 31a, 31b, and 31c The stickers 33a, 33b, and 33c which printed \*\*\*\* which showed what lighting of each LED would mean are stuck, a sticker 32 is further stuck on these bottoms, and it specifies that a running cost is displayed by LED 31a, 31b, and 31c.

[0084] That is, in a display 6, it indicates that the color picture read by the color picture read station 1 by the signal 1, 2, and CONT 3 is a monochrome manuscript, a line drawing color copy, ~~or a full-color manuscript. Thus, a running cost is classifiable into two or more phases (three-~~stage in this case) with the height of the rate of printing.

[0085] In addition, although the example of an LED display was given here, the display which used the liquid crystal panel is sufficient as an indicator, and even if it displays \*\*\*\* of Stickers 33a, 33b, and 33c, it is not cared about according to a signal 1, 2, and CONT 3.

[0086] Next, the copy counter 7 is explained. This copy counter 7 is contained inside the body of image formation equipment, and the maintainer of equipment etc. usually uses it.

[0087] Drawing 7 shows the configuration of the copy counter 7. The signal 1, 2, and CONT 3 from the costs value calculation section 5 is inputted into a register 40.

[0088] This register 40 is a triplet configuration as shown in drawing 8 , and the signal 1, 2, and CONT 3 is assigned to the high order bit, the middle bit, and the lower bit, respectively. If a signal CONT3 is inputted, "4" will be outputted, for example, if a signal CONT2 is inputted, "2" will be outputted, for example, and if a signal CONT1 is inputted, "1" will be outputted, for example.

[0089] The output of a register 40 is inputted and added to an adder 41 with the signal nonvolatile and read from rewritable EEPROM42 electrically, and is again stored in EEPROM42 as a new addition value. Moreover, the addition value is inputted into a liquid crystal display 43, and displays the value.

[0090] Finally, the key counter 8 is explained. The appearance is removable to this equipment with the gestalt of an IC card, as shown in drawing 9 . When the body of image formation equipment is inserted and equipped with the key counter 8, the signal 1, 2, and CONT 3 from the costs value calculation section 5 of the body of equipment is inputted into the key counter 8 through the terminal area 50 prepared in the front face of the key counter 8 by exposing. Moreover, the drop 51 is formed in the front face of the key counter 8.

[0091] Drawing 10 shows roughly the configuration of the electric important section of the key counter 8.

[0092] In drawing 10 , the signal 1, 2, and CONT 3 inputted from the terminal area 50 is inputted into CPU53 through the interface section 52. Moreover, when the body of image formation ~~equipment is inserted and equipped with the key counter 8, this terminal area 50 serves as the~~ contact for electric power supplies, and can perform the electric power supply to the key counter 8.

[0093] The interface section 52 manages the interface of the body of image formation equipment, and CPU53.

[0094] CPU53 reads the addition value to current [ which has already been memorized by EEPROM55 ], adds the value according to a signal 1, 2, and CONT 3 to the addition value, and writes the addition value as the result in EEPROM55 again. At this time, the figure pattern equivalent to that addition value is read out of the pattern beforehand registered into PROM54,



and it displays on the drop 51 of a liquid crystal panel.

[0095] The program of the copy counter 8 of operation is memorized by PROM54, and CPU53 manages control of the copy counter 8 whole in it according to this program.

[0096] In addition, although the key counter 8 was made into structure without a power source, the mechanical number machine of tachometers is substituted for it, and you may make it display an addition value here, as a cell may be formed in the key counter 8 and the copy counter 7 explained further.

[0097] Drawing 11 is drawing showing the full color recording device concerning this invention.

[0098] In this drawing, the photo conductor drum 301 as image support is formed, and it rotates counterclockwise.

[0099] Around the photo conductor drum 301, the electrification machine 302, the 1st development counter 309, the 2nd development counter 310, the 3rd development counter 311, the 4th development counter 312, the front [ cleaning ] electric discharge machine 313, the photo conductor cleaner 314, and the imprint drum 315 as an imprint material base material are arranged.

[0100] As shown in drawing 5, there is the exposure section 303 which consists of the polygon mirror 307 which scans the laser beam from semiconductor laser (laser diode) 345,346, the polygon motor 308 which drives this polygon mirror 307, a half mirror 347 and a lens (not shown), and a mirror 304,305 in the question of the electrification machine 302 and the 1st development counter 309.

[0101] Development counters 309-312 develop the electrostatic latent image on the photo conductor drum 301 with the toner (developer) with which four colors differ, respectively (visualization), in a Magenta and the 2nd development counter 310, cyanogen and the 3rd development counter 311 possess Hierro, and, as for the 1st development counter 309, the 4th development counter 312 possesses the toner of black.

[0102] The photo conductor drum 301 uniformly charged in the front face with the electrification vessel 302 is exposed by the above-mentioned exposure section 303 therefore scanned by image data, and an electrostatic latent image is formed. After this electrostatic latent image is developed by the development counters 309-312 corresponding to said image data, the sequential imprint of it is carried out by operation of the imprint electrification machine 17 at the form as imprint material by which the imprint drum 315 was adsorbed electrostatic. After the non-imprinted toner on the photo conductor drum 301 is discharged with the electric discharge vessel 313 before cleaning, it is cleaned by the photo conductor cleaner 314. On the other hand, . to which a form is sent out with the feed roller 324, and ready grade is once carried out with the resist roller 325 from a cassette 323, and a form are sent with the resist roller 325 towards the adsorption roller 326 and the adsorption zone electrical machinery 316 which were prepared in the location corresponding to the adsorption location of the imprint drum 315, and the adsorption zone electrical machinery 316 adsorbs electrostatic on the imprint drum 315.

[0103] When performing imprint electrification multicolor printing prepared in after that and the location which counters the photo conductor drum 301 as mentioned above, the above-mentioned development process and an imprint process are repeated to a maximum of 4 times. The separation section 327 dissociates from the imprint drum 315, and the form with which the toner was imprinted is discharged by the tray 331 through the conveyance belt 328,329 and the fixing section 330 by it in order.

[0104] Moreover, drawing 12 is drawing showing the full color recording device concerning this invention.



[0105] The recording devices 403Y, 403M, and 403C which record the image of four colors of yellow (Y), a Magenta (M), cyanogen (C), and black (BK) as the body 401 of equipment will be in the photo conductor drums 402Y, 402M, and 402C, and 402BK and the parallel condition as image support to the interior, and 403BK are arranged among drawing 12. Since each recording devices 403Y, 403M, and 403C and 403betaK have the respectively same composition, they explain only recording device 3Y of the yellow arranged at the preceding paragraph, attach the suffix which shows the same sign and same color as the same part about other recording devices 403M and 403C and 403BK, and omit explanation. The above-mentioned recording device 403Y is prepared corresponding to photo conductor drum 402Y and this, and has image formation means 404Y for repeating and forming a yellow image on photo conductor drum 402Y. Image formation means 404Y consists of electrification equipment 405Y, aligner 406Y, developer 407Y, cleaning equipment 408Y, electric discharger 409Y, etc.

[0106] Moreover, the imprint conveyance belt 420 as an imprint material conveyance means is stretched, and the lower part of each above-mentioned recording devices 403Y, 403M, and 403C and the arrangement location of 403BK conveys the imprint material 410, such as a form, to said photo conductor drums 402Y, 402M, and 402C and 402betaK.

[0107] furthermore, in the location which counters said photo conductor drums 402Y, 402M, and 402C and 402Bkappa The imprint conveyance belt 420 is inserted. Imprint equipment 421Y as a transfer means, 421M, 421C, and 421BK are arranged, and M, 402C, and the toner image of each color formed in 402betaK are imprinted on the above-mentioned photo conductor drum 402Y and 402 imprint material 410 conveyed with the conveyance belt 420. The above-mentioned imprint material 410 takes timing, and is supplied by the feed system 422 on the conveyance belt 420.

[0108] the delivery roller pair to which the above-mentioned feed system 422 conveys the pickup roller 423 which takes out the imprint material 410 from a sheet paper cassette 419, and the imprint material 410 taken out with this pickup roller 423 as shown in drawing 12 -- the resist roller pair which takes and sends in timing while performing tip ready grade of the imprint material 410 conveyed by 424 and this delivery roller pair 424 -- it consists of 425.

[0109] The flow velocity of the imprint material 10 by above-mentioned resist roller pair 425 and said above-mentioned imprint conveyance belt 420 is set up so that it may become the peripheral speed of the photo conductor drums 402Y, 402M, and 402C and 402betaK, and uniform velocity.

[0110] moreover -- the imprint material conveyance direction (left in drawing) by above-mentioned imprint \*\*\*\*\* RUTO 420 -- an anchorage device 426 and a delivery roller pair -- sequential arrangement of 427 and the paper output tray 428 is carried out, and the control section 50 which performs motion control of the equipment of each recording devices 403Y, 403M, and 403C, 403BK, the feed system 422, and others is formed in the inner pars basilaris ossis occipitalis of the above-mentioned body 401 of equipment.

~~[0111]-When color picture formation is specified from the actuation input section which carries out a deer and which is not illustrated, each recording devices 403Y, 403M, and 403C of IE opening - (Y), a Magenta (M), cyanogen (C), and black (BK) and 403betaK operate to predetermined timing, and the toner image of each color is formed on each photo conductor drums 402Y, 402M, and 402C and 402BK.~~

[0112] That is, if recording device 403Y is taken for an example, while photo conductor drum 402Y rotates in the direction of the clockwise rotation in drawing (the direction of arrow-head A), the front face will be uniformly charged by electrification equipment 405Y. Subsequently, on



this photo conductor drum 402Y charged uniformly, exposure actuation by aligner 406Y is performed, and the latent image corresponding to a yellow image is formed. When this latent image counters developer 7Y, a toner will be supplied and developed and a yellow toner image will be formed on photo conductor drum 402Y.

[0113] In addition, in the recording devices 403M and 403C of other colors, and 403BK, a toner image will be formed similarly. on the other hand, synchronizing with formation actuation of this toner image, the imprint material 10 takes out from a sheet paper cassette 419 -- having -- a resist roller pair -- after carrying out ready grade of the tip by 425, the imprint material 10 is sent in on the imprint conveyance belt 420.

~~[0114] the imprint material 410 sent in on the imprint conveyance belt is conveyed along with transit of the imprint conveyance belt 420, after the imprint conveyance belt 420 has been~~ adsorbed electrostatic by the adsorption roller 429 as an adsorption means -- having -- first -- a yellow toner image imprint location -- namely, -- that is, it is sent into the location where photo conductor drum 402Y and imprint equipment 421Y oppose on both sides of the imprint \*\*\*\* belt 420.

[0115] While the yellow toner image on photo conductor drum 402Y will be touched the imprint material 410 in this yellow toner image imprint location, therefore, the yellow toner image on imprint equipment 421Y is imprinted by work of imprint equipment 421Y on the imprint material 10.

[0116] The above-mentioned imprint equipment 421Y is constituted by the imprint roller which has half-conductivity, and supplies the electric field which have the potential and reversed polarity of the yellow toner image which has adhered to photo conductor drum 2Y electrostatic from the background of the conveyance belt 20. This electric field act on the yellow toner image on photo conductor drum 402Y through the conveyance belt 402 and the imprint material 410, and, as a result, a yellow toner image is imprinted by the imprint material 10 from photo conductor drum 2Y.

[0117] The above-mentioned imprint equipment 421Y is constituted by the imprint roller which has half-conductivity, and supplies the electric field which have the potential and reversed polarity of the yellow toner image which has adhered to photo conductor drum 2Y electrostatic from the background of the conveyance belt 20. This electric field act on the yellow toner image on photo conductor drum 402Y through the conveyance belt 402 and the imprint material 410, and, as a result, a yellow toner image is imprinted by the imprint material 10 from photo conductor drum 2Y.

[0118] Thus, subsequently to the toner image imprint location of each recording apparatus of Magenta recording apparatus 403M, cyanogen recording apparatus 403C, and black recording apparatus 403betaK sequential conveyance of the imprint material 10 by which the yellow toner image was imprinted is carried out, the sequential imprint of a Magenta toner image, a cyanogen toner image, and the black toner image is carried out, and a color picture is formed.

~~[0119] the delivery roller pair after the imprint material 410 in which the color toner image was formed subsequently exfoliated from the imprint conveyance belt 420, and was sent into the anchorage device 426 and permanent fixing of a color toner image which carried out the color pile was performed -- it is taken out by the paper output tray 428 through 427.~~

[0120] On the other hand, the rotation drive of the imprint conveyance belt 420 with which imprint material exfoliated is carried out as it is, a residual toner and paper powder are cleaned by belt chestnut-NINGU equipment 431, and, subsequently surface potential is fixed with the electric discharge roller 430.



[0121] Moreover, the rotation drive of the photo conductor drums 402Y, 402M, and 402C after the toner image was imprinted, and the 402BK is carried out as it is, a residual toner and paper powder are cleaned by the cleaning equipments 408Y, 408M, and 408C and 408BK, and, subsequently surface potential is fixed with electric dischargers 409Y, 409M, and 409C and the electric discharge lamp of 409betaK. And it will go into the electrification equipments 405Y, 405M, and 405C and a series of processes of 405betaK again if needed.

[0122] In the above, the image formation equipment of a configuration as explained is explained with reference to the flow chart shown in drawing 13 about the processing of operation which is the 1st example.

~~[0123] If the copy-initiation-switch which a manuscript is set to the color picture read station 1, and is not illustrated is pushed, first, the registers 16a-16d of drawing 4 and the register 40 of drawing 8 will be reset, and all of those values to hold will be set to "0" (S1).~~

[0124] next, the 1st color data R, G, and B of the color picture read station 1 to a certain unit pixel -- a 8-bit digital signal is inputted each into the color transducer 2 (S2).

[0125] the color transducer 2 shows to drawing 2 -- as -- the 2nd color data R, G, and B -- data 8 bits each -- chrominance signals c, m, and y -- it is changed each into 8-bit data, and is continuously shown in drawing 3 -- as -- the 2nd color data Y, M, C, and K -- it is changed each into 8-bit data, and is outputted to the color picture Records Department 3 and the article-of-consumption calculation section 4 (S3).

[0126] the color picture Records Department 3 -- the 2nd color data Y, M, C, and K -- (S4) which forms a part for color 1 picture dot in record media, such as a form, based on data 8 bits each.

[0127] the 2nd color data Y, M, C, and K sent to the article-of-consumption calculation section 4 on the other hand -- as shown in drawing 4, in Adders 15a, 15b, 15c, and 15d, 8-bit data are added each with the value which Registers 16a, 16b, 16c, and 16d hold, respectively, and are again stored in 16a, 16b, 16c, and 16d (S5).

[0128] The above actuation is performed to all the unit pixels outputted from the color picture read station 1, for example, processing of the following step S3 - step S5 is performed by step S2 to return, the 1st color data R and G of the following unit pixel, and b eight bit data each until image 1 fraction of A3 size is read and completed with an image reader (S6).

[0129] After image 1 fraction is read and completed by the color pixel read station 1, addition color data sigmaY, sigmaM, sigmaC, and sigmaK are outputted to the costs value calculation section 5 from the article-of-consumption calculation section 4 (S7).

[0130] As the costs value calculation section 5 shows to drawing 5, sequential addition of the value of addition color data sigmaY, sigmaM, and sigmaC is carried out by Adders 20a, 20b, and 20c. As the result Moreover (sigmaY+sigmaM+sigmaC+sigmaK) compares comparatively the size of the value of (sigma Y+sigma M+sigma C), and the value of sigmaK by 21b, 21a compares a value and a threshold T comparatively, those results are processed in logical circuits 22 and 23, and a signal 1, 2, and CONT 3 is outputted. In the case of this example, it will be distinguished by the following three-stage if the output value of a signal 1, 2, and CONT 3 is expressed for every classification of a manuscript.

[0131] A) case of a monochrome manuscript or the manuscript near monochrome with little color (sigma Y+sigma M+sigma C) < -- sigmaK It becomes and they are CONT 1= 1, CONT 2= 0, and CONT 3= 0.

[0132] B) color is abundant -- case of the color copy of an alphabetic character or a diagram subject with little [ but ] record area (sigma Y+sigma M+sigma C) >= sigmaK and (sigma



$Y + \sigma M + \sigma C$  -- < -- It is set to T and they are  $CONT\ 1 = 0$ ,  $CONT\ 2 = 1$ , and  $CONT\ 3 = 0$ .

[0133] C) case of a full color manuscript [ like many natural drawings ] whose color and record area is also  $(\sigma Y + \sigma M + \sigma C) \geq \sigma K$  and  $(\sigma Y + \sigma M + \sigma C) -- \geq$  It is set to T and they are  $CONT\ 1 = 0$ ,  $CONT\ 2 = 0$ , and  $CONT\ 3 = 1$ .

[0134] A signal 1, 2, and  $CONT\ 3$  is outputted to each of the copy counter 7 contained the display 6 installed from the costs value calculation section 5 on the control panel for the users who do not illustrate, and inside the body of image formation equipment, and the key counter 8 with which the body of image formation equipment is equipped by the user in case it is used (S8).

[0135] Now, if a signal 1, 2, and  $CONT\ 3$  is inputted into a display 6, as shown in drawing 6, the LED lighting circuits 30a, 30b, and 30c will drive, and any one of the LED 31a, 31b, and 31c corresponding to a signal 1, 2, and  $CONT\ 3$  will light up, respectively. the label 32 written to be "a running cost display" beside this LED group -- and -- "-- label 33a of full color; 4 time" -- "line drawing color : Label 33b of twice" and "standard" label 33c for monochrome:are stuck. the case of above-mentioned C -- "-- full color: -- LED31a to which label 33a of 4 time" was given the case of B) -- "-- diagram color: -- LED31b to which label 33b of twice" was given the case of A) -- "-- monochrome: -- (S9) which indicates that a costs [ manuscript / which LED31c to which label 33c of standard" was given lights up, and is installed in the image read station 1 ] setup according to it is made to a user by the classification of each \*\*\*\*\*.

[0136] In the copy counter 7, a signal 1, 2, and  $CONT\ 3$  is inputted into a register 40, and the costs values 4, 2, and 1 corresponding to Above A, B, and C are outputted. The value which this costs value was added to the costs value till then already stored in EEPROM42 by the adder 41, consequently was updated is stored again. Moreover, the value stored by this EEPROM42 can be checked with a liquid crystal display 43, in case a maintainer etc. asks a user for a toll (S10).

[0137] On the other hand, in the key counter 8, according to the program memorized by PROM822, the signal 1, 2, and  $CONT\ 3$  from the costs value calculation section is incorporated by CPU53 through a terminal area 50 and the interface section 52, and after the value is added to the value already written in EEPROM55, it is again stored in EEPROM55. Moreover, the stored value is displayed on a drop 51 (S11).

[0138] The example described above can carry out deformation application in the range which does not deviate from the main point. For example, after showing a user a costs value and obtaining comprehension before carrying out hard copy actuation at the color picture Records Department 3, it is possible to also make actuation start, and it of added value is higher. In this case, it attaches and the following 2nd - the 3rd example explain.

[0139] First, processing of image formation equipment of operation is explained as the 2nd example with reference to the flow chart shown in drawing 14. In addition, the same sign is given to the same part as drawing 13, and only a different part is explained. That is, step S4 of ~~drawing 13~~ is deleted and processing of step S20 of drawing 14 -- step S21 is added between processings of step S9 and step S10.

[0140] Although record (S4) at the color picture Records Department 3 was performed in the 1st example of drawing 13 when it computed the value of addition color data  $\sigma Y$ ,  $\sigma M$ ,  $\sigma C$ , and  $\sigma K$  for every pixel In the 2nd example of drawing 14, the operation of addition color data  $\sigma Y$ ,  $\sigma M$ ,  $\sigma C$ , and  $\sigma K$  is completed (S6, S7). A costs value is computed (S8), the actuation which checks the depression of the copy initiation key by the user after LED which shows a costs value by the display 6 on a control panel lights up (S9) is added,



and it is considering as what is recorded after the check (S20) (S21).

[0141] Output actuation will be started, after showing the user the costs value and obtaining comprehension of a user by this, before starting actuation of a hard copy output.

[0142] If a means (specifically for example, ROM) to store the 2nd color data Y, M, C, and K is prepared for the color picture Records Department 3 at this time When the 2nd color data Y, M, C, and K is outputted at step S3, it becomes possible to store the 2nd color data for one screen at the color picture Records Department 3, and hard copy can be performed at step S21 based on the 2nd color data accumulated with the are recording means.

[0143] Moreover, if preparing in the color transducer 2 is also possible and the depression of a copy-initiation-key is checked at step S20, the 2nd color data accumulated with the are recording means of the color transducer 2 is transmitted to the color picture Records Department 3, and such an are recording means is step S21, and can perform hard copy at the color picture Records Department 3.

[0144] Furthermore, it is also possible to establish a means to store the 1st color data R, G, and B in the color transducer 2. In this case, when the 1st color data R, G, and B is outputted to the color transducer 2 at step S2, in the color transducer 2, the 1st color data for one screen is stored. If the depression of a copy initiation key is checked at step S20, the 1st color data accumulated with the are recording means of the color transducer 2 is changed into the 2nd color data, it is transmitted to the color picture Records Department 3, and hard copy can be performed at step S21 at the color picture Records Department 3.

[0145] When the case where the are recording means of the 1st color data is formed in the color transducer 2 is compared with the case where the are recording means of the 2nd above-mentioned color data is prepared for the color transducer 2 or the color picture Records Department 3, since there is less amount of data than the 2nd color data, the 1st color data has the advantage that there is little capacity of the are recording means, and it ends.

[0146] What is necessary is just to perform processing of operation like the flow chart shown in drawing 15, when a means to store the 1st color data or the 2nd color data cannot be established, as mentioned above.

[0147] Next, processing of the image formation equipment in this case of operation is explained [ 3rd ] as an example with reference to the flow chart shown in drawing 15. In addition, the same sign is given to the same part as drawing 14, and only a different part is explained. That is, step S21 of drawing 14 has replaced processing of step S30 - step S32.

[0148] When the depression of a copy initiation key is checked at step S20, the manuscript again set there by the color picture read station 1 will be read, the 1st color data will be outputted (S30), it will change into the 2nd color data by the color transducer 2 (S31), and hard copy will be performed based on the 2nd color data at the color picture Records Department 3 (S32).

[0149] In this case, image reading at the time of costs value calculation of step S1 - step S9 (S2) serves as a PURISU can without an image output (hard copy) substantially. Moreover, since activation of hard copy is almost as possible as the depression of a copy initiation key on real time at the color picture Records Department 3, there are especially no problems, such as the response time.

[0150] Although the costs value was explained as fixed asset to net worth ratio of 1, 2, and 4 to Above A, B, and C, it may enable it to choose realistic to set [ which to be also able to set up setting up a costs value freely and is easy to be accepted in a user ] up in the above explanation of the 3rd of the 1st - an example.



[0151] For example, in electrophotography method record of 4 ream process which has 4 sets of imaging means which consist of a photo conductor, a development counter, etc. as the color picture Records Department 3, it is thought that only the consumption of the toner which is color material increases, and to monochrome, it is full color, sets up with 10 times twice, in a line drawing color, and considers as a cost setup called basic copy cost + color-material consumption (form + photo conductor etc.). If the basic costs value of b and color-material consumption is set to c for basic costs values, such as a and a photo conductor, the basic costs value of the form in the case of the electrophotography method of only monochrome specifically the case of said A --  $4b$ , such as a form a+ photo conductor, ]+ color-material consumption  $c=a+4b+c$  -- the case of said B --  $4b$ , such as a form a+ photo conductor, ]+ color-material consumption  $2c=a+4b+2c$  -- in the case of said-C, a form a+ photo-conductor-etc.-is-set-to- $4b$ + color-material consumption  $10c=a+4b+10c$ .

[0152] On the other hand, in the electrophotography method record from which a metaphor obtains a color picture by four rotations with one photo conductor as the color picture Records Department 3, there is little consumption of the photo conductor part in monochrome, therefore it becomes a cost setup called basic copy cost (form) + monochrome / color difference Kos + color-material consumption. Specifically, in said A, in the b+ color-material consumption  $c=a+b+c$  above B, such as a form a+ photo conductor, a form a+ photo conductor etc. is set to  $4b$ + color-material consumption  $10c=a+4b+10c$ , such as a form a+ photo conductor, in the case of  $4b$ + color-material consumption  $2c=a+4b+2c$  aforementioned C.

[0153] What is necessary is to write beforehand the above-mentioned costs value setting formula and the value of a, b, and c in PROM54 as the same configuration as the key counter 8 as shown in drawing 10, and just to calculate the configuration of the drop 6 on a control panel, or the electric important section of the copy counter 7 by CPU53, in setting up such a costs setting approach.

[0154] Furthermore, in the above explanation of the 3rd of the 1st - an example, addition color data are computed by integrating the value of the 2nd [ covering all the pixels inputted into Adders 15a-15d in the article-of-consumption calculation section 4 ] color data. In this case, it does not restrict and the 2nd data inputted into Adders 15a-15d is not made into all pixels, but after thinning out in  $1/n$  as an input in every n pixels, addition color data  $\sigma_Y$  which is statistically convenient,  $\sigma_M$ ,  $\sigma_C$ , and  $\sigma_K$  can be obtained by n Doubling a Registers [ 16a-16d ] output. This approach aims at making processing speed ease and managing the software processing by CPU. In addition, 8 and 16 grades can be considered as a value of n.

[0155] Next, the 4th example is explained. Drawing 16 is what showed roughly the configuration of the image formation equipment applied [ 4th ] to an example, gives the same sign to the same part as drawing 1, and explains only a different part. That is, the color picture read station 1 of drawing 1 has replaced the color picture input interface section 40.

[0156] In drawing 16, the color picture input interface section 45 consists of the network controller 41 shown in drawing 17, and an image memory 42, receives the color picture data transmitted from networks, such as colors FAX and LAN, by the network controller, and after it performs predetermined transform processing etc., it stores them in an image memory 42 here.

[0157] Any, such as XYZ of  $L^* a^* b^*$  of three-primary-colors RGB of light and uniform color space and a chromaticity display, are sufficient as this color picture data. Since an image memory 42 becomes the minimum configuration for it to be error diffusion data binary [ for covering a pixel partially by the dot of single concentration, and performing a concentration display especially ] etc., it is desirable.



[0158] The color transducer 2 carries out color conversion through chrominance signals c, m, and y at the 2nd color data Y, M, C, and K from 3 sets of color picture data from the color picture input interface section 40. Namely, what is necessary is to transpose RGB of the several 1 right-hand side to 3 sets of color picture data, and just to select matrix coefficient A 11-A33. In addition, other configurations are the same as that of the 1st example.

[0159] As explained, according to the above 1st - the 4th example, the color copy set by the color picture read station 1 is read. As mentioned above, the 1st color data R G and B are outputted and it changes into the 2nd color data Y, M, C, and K corresponding to the color component of actual record material by the color transducer 2. Based on the 2nd color data in the article-of-consumption calculation section 4 Compute the consumption of each record material for color picture 1 screen, output as addition color data, and based on the consumption of the record material by the addition color data in the costs value calculation section 5 Classify into the manuscript near monochrome, a line drawing color copy, or a full color manuscript, and a costs value is computed according to the costs value ratio (in the case of the 1st example, it responds to the rate of printing and is 1:2:4) according to the classification. By displaying on a display 6, or the copy counter 7 and the key counter 8 which are also a means for a costs value claim of evidence integrating, and memorizing and displaying the addition value It becomes possible to be able to carry out a costs value setup about the color copy set to the color picture read station 1 according to the consumption (rate of printing) of each record material computed based on the 2nd color data, therefore to change a running cost according to the rate of printing.

[0160] Hereafter, the 5th example of this invention is explained with reference to a drawing.

[0161] Drawing 18 shows the whole this invention configuration concerning the 5th example. The color picture reading sections 1 are a color scanner, a color camera, etc., and for every unit pixel which divided the color picture used as a manuscript in all directions, body light is changed into the electrical signal according to the three primary colors of the light of R (red), G (Green), and B (blue), and they output it as 8-bit digital data and 1st color data respectively for every pixel. The color transducer 2 changes and outputs the 1st color data of 8 bits each of RGB inputted for every pixel to data of 8 bits each of 2nd color data YMCK equivalent to the amount of the color material of Y (yellow), M (Magenta), C (cyanogen), and K (black) which are the three primary colors of ink. The color picture Records Department 3 makes the color material of YMCK of the amount according to data of 8 bits each of 2nd color data YMCK adhere to a form, and does a hard copy output. On the other hand, data of 8 bits each of 2nd color data YMCK are led to the article-of-consumption calculation section 4, and the amount of the article of consumption for color picture 1 screen is computed. Based on the amount of the article of consumption for one screen of YMCK, the costs value calculation section 5 outputs two or more steps of costs values by the Ruhr set up beforehand. A display 6 is the liquid crystal panel installed on the control panel for users of this equipment, or an LED array, and displays a costs value. The copy counter 7 is the object which combined drops, such as the number machine of mechanical tachometers or nonvolatile memory, liquid crystal, etc. which were installed on a control panel or in the interior of equipment, whenever it carries out the hard copy output of one sheet at the color picture Records Department 3, according to the costs value, advances enumerated data and goes. If a hard copy output is made from the color picture Records Department 3 when the key counter 8 is a removable counter, and is the object which combined drops, such as the same number machine of mechanical tachometers or nonvolatile memory as the copy counter 7, and liquid crystal, and equipment is equipped with it to equipment, enumerated data will advance according to the costs value.



outputted to register 16a. In case the color picture reader 1 reads color picture 1 screen and begins, the zero clear of the register 16a is carried out, and it integrates Y data of the image for one screen, and outputs the value  $\sigma Y$  at the time of reading termination of color picture 1 screen. Similarly, the addition result  $\sigma M$ ,  $\sigma C$ , and  $\sigma K$  are outputted also for M data, C data, and K data from Registers 16b, 16c, and 16d, respectively.

[0170] Noting that the color picture Records Department does hard copy of the color picture to A3 size by 400dpi the maximum amount of data  $8 \times 297 \times 420 \times (400/25.4) \times 2 = 2.5 \times 10^8$  it is -- since, although 28 bits of each are sufficient for Registers 16a, 16b, 16c, and 16d Even if it does not make Adders [ 15a, 15b, 15c, and 15d ] input data into all pixels but thins out in 1/n as an input-in-every-n-pixels,  $\sigma Y$  and  $\sigma M$  which are statistically convenient,  $\sigma C$ , and  $\sigma K$  can be obtained by n Doubling a Registers [ 16b, 16c, and 16d ] output. . .

[0171] Then, the costs value calculation section 5 is explained to a detail using drawing 19 .

[0172]  $\sigma Y$  from the article-of-consumption calculation section,  $\sigma M$ ,  $\sigma C$ , and four values of  $\sigma K$  are inputted into the costs value calculation section. The value of  $\sigma Y$  and  $\sigma M$  is inputted into an adder 501, the added output value ( $\sigma Y + \sigma M$ ) is further inputted and added to an adder 502 with the value of  $\sigma C$ , and the value of ( $\sigma Y + \sigma M + \sigma C$ ) is outputted. This output value ( $\sigma Y + \sigma M + \sigma C$ ) is inputted into a comparator 512 with the value of  $\sigma K$ . Furthermore,  $\sigma K$  is inputted into a comparator 513 with a threshold T2. Then, the output of AND gate 524 is a signal CONT0.;

$\sigma Y + \sigma M + \sigma C < \sigma K$  it is --  $\sigma K \geq T2$  The time Output 0  $\sigma K < \sigma T2$  The time It becomes an output 1. Printing is almost monochrome and this, i.e., CONT0 means, is a case with little consumption of record material. moreover -- next, the output signal CONT1 of AND gate 523 -- signal CONT1:  $\sigma Y + \sigma M + \sigma C \geq \sigma K$  The time Output 0  $\sigma Y + \sigma M + \sigma C < \sigma K$  it is --  $\sigma K \geq T2$  The time It becomes an output 1.

[0173] On the other hand, the value of ( $\sigma Y + \sigma M + \sigma C$ ) and  $\sigma K$  is inputted into an adder 503, and the value of the aggregate value ( $\sigma Y + \sigma M + \sigma C + \sigma K$ ) is outputted and it is inputted into a comparator 511. Another input value of a comparator 511 is threshold T set up beforehand. the output signal of this comparator 511 --

$\sigma Y + \sigma M + \sigma C + \sigma K \geq T$  The time Output 0  $\sigma Y + \sigma M + \sigma C + \sigma K < T$  The time an output 1 -- with the output signal (signal CONT1) of a comparator 512, the output signal of this comparator 511 has logic reversed, and is inputted into AND element 521. therefore, the output signal of AND element 521 -- signal CONT3:  $\sigma Y + \sigma M + \sigma C \geq \sigma K$  it is -- and  $\sigma Y + \sigma M + \sigma C + \sigma K < T$  The time Output

0  $\sigma Y + \sigma M + \sigma C + \sigma K \geq T$  The time an output 1 -- further The signal which reversed the logic of the output signal of a comparator 512, and the output signal of a comparator 511 are inputted into AND element 522. the output signal -- signal CONT2:  $\sigma Y + \sigma M + \sigma C \geq \sigma K$  it is -- and  $\sigma Y + \sigma M + \sigma C + \sigma K \geq T$  The time Output

0  $\sigma Y + \sigma M + \sigma C + \sigma K < T$  The time an output 1 -- it is here and a display 6 is explained. The display 6 which the control panel for a user to input workmanship instruction into a front face is formed, and shows the image formation equipment of this invention to the part at drawing 20 is arranged. Four signals, CONT3, CONT2, CONT1, and CONT0, are inputted into a display 6 from the costs value calculation section 5. Each signal is inputted into the LED lighting circuits 30a, 30b, 30c, and 30d, and only when each input signal is 1, LED 31a, 31b, 31c, and 30d is made to turn on. Although the right-hand side of a wavy line N shows the display on a control panel, LED [ 31a, 31b, 31c, and 31d ] horizontally the stickers 33a, 33b, 33c, and 33d



which printed \*\*\*\* of illustration are stuck, and the sticker 32 is further stuck on the bottom. [0174] In addition, although the example of an LED display was given here, the display which used the liquid crystal panel is sufficient as an indicator, and even if it displays Stickers [ 33a 33b, 33c, and 33d ] \*\*\*\*, it is not cared about according to signals CONT3, CONT2, CONT1, and CONT0.

[0175] Next, the copy counter 7 is explained. Drawing 21 shows the configuration of the copy counter 7. It is put into the signals CONT3, CONT2, CONT1, and CONT0 from the costs value calculation section 5 by the register 40. As this register is shown in drawing 22 , signals CONT3, CONT2, CONT1, and CONT0 are assigned to the high order bit, the middle bit, the lower bit, and the last bit by 4 bit patterns, respectively, and if 1 is CONT0 when a signal CONT3 is inputted, an output is CONT2 4 and 2 is CONT1, 0 will be outputted, respectively. This output is inputted and added to an adder 41 with the signal nonvolatile and read from rewritable EEPROM42 electrically, and is again stored in EEPROM42 as a new addition value. Moreover, the addition value is inputted into a liquid crystal display 43, and displays the value.

[0176] Then, the key counter 8 is explained. The key counter 8 is removable to this equipment with the gestalt of an IC card. A configuration is shown in drawing 9 . The signals CONT3, CONT2, CONT1, and CONT0 from the costs value calculation section 5 are inputted into CPU53 through a terminal area 50 and the interface section 52. Moreover, this terminal area 50 serves also as the contact for electric power supplies from image formation equipment 10 to the key counter 8. CPU53 applies the aggregate value according to the signals CONT3, CONT2, CONT1, and CONT0 to the old addition value read from EEPROM42, and writes a new addition value in it again at EEPROM55. Furthermore, out of the pattern beforehand registered into PROM54, the figure pattern equivalent to a new addition value is read, and it displays on the drop 51 of a liquid crystal panel. The terminal area 50 and the drop 51 have exposed the appearance of the key counter 8 to the front face of a package 8 like drawing 10 .

[0177] In addition, although considered as the structure which does not have a power source here, a cell may be formed in a key counter, and as the copy counter 7 explained further, a mechanical rotation integrator may be substituted.

[0178] Moreover, drawing of the control panel of the image formation equipment which drawing 33 requires for one example of this invention, and drawing 34 are the block flow diagrams of the control panel of drawing 33 . It is also possible to express a costs value as one of the displays of the liquid crystal screen (LIQUID CRYSTAL DISPLAY) 102 of the control panel 101 which does not form the display 6 ( drawing 1 ) of dedication as a display of a costs value as one modification of this invention, but is contained at the color picture Records Department 3. at this time, the thing of dedication is not prepared, but displaying on the liquid crystal screen 102 also obtains the copy counter 7 and the key counter 8, and they come out of it.

[0179] The control panel 101 has CPU110, PROM111, the gate array 109, the I/F buffer 108, RAM107, the LCD controller driver 106, LCD102, the LED driver 105, LED104, the key switch 103, and touch panel 102 only for panels as an example.

[0180] By these configurations, CPU only for control panels receives the directions which an operator gives through a touch panel 102 and a key switch 103, and this directions information is transmitted to the color picture Records Department 3. Thereby, record of a color picture is performed.

[0181] Moreover, the costs value result from the costs value calculation section 5 and a copy counter value, and a key counter value are also further displayed on LCD102 through dedication CPU 110.



[0182] Next, the statistics processing section 9 shown in drawing 23 is explained. While the value of  $\sigma_Y$ ,  $\sigma_M$ ,  $\sigma_C$ , and  $\sigma_K$  is inputted from the article-of-consumption calculation section 4, the signal of a costs value is inputted into the statistics processing 9 from the costs value calculation section. Each value is contained by the information memory 910 which consists of EEPROMs with the output value of a timer 901. The main control section 940 operates according to the program memorized by the program memory 920 which is mainly constituted by a microcomputer and its circumference circuit and is constituted by nonvolatile memory. The statistics data memory 930 is memory which stores the data of a result which the main control section 940 processed with the statistics processing program of program memory 950 based on the data which were constituted by rewritable EEPROM and stored in the information memory 910. Such information memory 910, program memory 920, the statistics data memory 930, and a timer 901 are connected with the main control section 940 by the data bus 950, respectively. Moreover, this data bus is connected also with the communication link unit 108.

[0183] The communication link unit 61 shown in drawing 24 is explained. The communications control section 1081 of the communication link unit 61 is connected with the main control section 940 of information storage / processing unit, and transmission and reception of data and transmission and reception of a control signal are performed through a data bus 950. Moreover, the communications control section 1081 is connected with communication link unit 61 memory 930, and the timer 901 is connected with the main control section 940 by the data bus 950, respectively. Moreover, this data bus is connected also with the communication link unit 108.

[0184] The communication link unit 61 shown in drawing 24 is explained. The communications control section 1081 of the communication link unit 61 is connected with the main control section 940 of information storage / processing unit, and transmission and reception of data and transmission and reception of a control signal are performed through a data bus 950. Moreover, the communications control section 1081 is connected to the timer 1082 in the communication link unit 61, the pattern generator 1083, the communication interface 1084, etc. Modulator and demodulator 1085 are connected to the communication interface 1084. Modulator and demodulator 1085 modulate the information on the various data sent from a communication interface 1084, or others to the sound signal of the data format suitable for a transfer, restore to the data further received through the network control section 1086 according to the transmitting format, and send them out to the communications control section 1081 through the communication link interface 1084. Here, the network control section 1086 is for performing a switch of the case where a circuit is used for telebrief, and the case where it is used for data communication, detection of a terminating signal, an auto dial, etc. A timer 82 performs a time check required for the various processings which the communications control section 1081 performs, and also it has a clock function for a communication link, and the processing which performs the communication link of various data or information at the set time amount, for example, the midnight which does not use a circuit for telebrief, is presented with it. The communications control section 1081 to code data are changed into a receipt and the character pattern which is the image data which corresponds this, and a pattern generator 1083 outputs them to a communication interface 1084. Thereby, also when the data transfer point is the device which treats image data like facsimile apparatus, it can respond.

[0185] The external device 62 shown in drawing 25 is explained. Fundamentally, the external device 62 is constituted by the network control section 1092, modulator and demodulator 1093, and the processor 1094. Through a control device 1094-1, display on the displays 1094-2, such



as a CRT display, it prints with the airline printers 1094-3, such as a printer, or modulator and demodulator 1093 store the data received from the public line 63 through the control section 1092 in the storage 1094-4, such as a floppy disk. Moreover, the processor 1094 is equipped with the input units 1094-5, such as a keyboard, for example, can require various data transfers from the communication link unit 61 from an external device 62 side.

[0186] Now, actuation of the image formation equipment which consists of the above configuration is explained using <A

HREF="/Tokujitu/tjitemdrw.ipdl?N0000=237&N0500=1E\_N/?7=;>?>6///&N0001=625&N0552=9&N0553=000030" TARGET="tjitemdrw"> drawing 26.

—[0187] If the copy initiation-switch-which-a-manuscript is set to the color-picture reading section 1, and is not illustrated is pushed, the registers 16a, 16b, 16c, and 16d of drawing 4 and the register 40 of drawing 22 will be reset, and all of those \*\* values will be set to 0 (S51).

[0188] Next, from the color picture reading section 1, digital data of 8 bits each of RGB of a certain unit pixel is inputted into the color transducer 2 (S52). In the color transducer 2, as shown in drawing 2, data of 8 bits each of this RGB are changed into data of 8 bits each of ends cmY, and continuously, as shown in drawing 3, it is changed into data of 8 bit each of YMCK(s), and is outputted to the color picture Records Department 3 and the article-of-consumption calculation section 4 (S53).

[0189] The data of 8 bit each of YMCK(s) sent to the color picture Records Department 3 turn into data which form a part for color 1 picture dot in record media, such as a form, (S54). On the other hand, as shown in drawing 4, Adders 15a, 15b, and 15c and the new value of YMCK are applied to the value currently stored in Registers 16a, 16b, 16c, and 16d by 15d, respectively, and the data of 8 bit each of YMCK(s) sent to the article-of-consumption calculation section 4 are stored in Registers 16a, 16b, 16c, and 16d (S55).

[0190] The above actuation is performed to all the unit pixels outputted from the color picture reading section 1, for example, it returns to step 52 and processing is performed to RGB eight bit data each of the following unit pixel until image 1 fraction of A3 size is read and completed with an image reader (S56).

[0191] After image 1 fraction is read and completed with an image reader, the value of sigmaY, sigmaM, sigmaC, and sigmaK is outputted to the costs value calculation section from the article-of-consumption calculation section 4 (S57). As the costs value calculation section shows to drawing 19, sequential addition of the value of sigmaY, sigmaM, and sigmaC is carried out by adders 501 and 502. The size of a value and the value of sigmaK is compared by the comparator 512. the (sigma Y+sigma M+sigma C) -- Value and threshold T is compared by the comparator 511, the result is processed by the logical element 521, 522, and moreover (sigma Y+sigma M+sigma C) outputs a signal to output terminals CONT0, CONT1, CONT2, and CONT3. When the combination makes the classification of a manuscript, and an input signal correspond, it is A monochrome manuscript or a manuscript near monochrome with little color. time there is little consumption (sigma Y+sigma M+sigma C) <= sigmaK and -- sigmaK <= T2 They are a ->CONT 0= 1, CONT 1= 0, CONT 2= 0, and CONT3=0B monochrome manuscript or a manuscript near monochrome with little color. When there is fixed consumption (sigma Y+sigma M+sigma C) <= sigmaK -- and -- sigmaK > T2 ->CONT 0= 0, CONT 1= 1, CONT 2= 0, and CONT3=0C color is abundant -- color copy of an alphabetic character with little [ but ] record area, or a diagram subject (sigma Y+sigma M+sigma C) > sigmaK -- and -- (sigma Y+sigma M+sigma C) <= T Full color manuscript [ like many natural drawings ] whose ->CONT 0= 0, CONT 1= 0, CONT 2= 1, and CONT3=0D color and record area is also (sigma



$Y + \sigma M + \sigma C > \sigma K$  -- and --  $(\sigma Y + \sigma M + \sigma C) > T$  They are  $\rightarrow$  CONT 0 = 0, CONT 1 = 0, CONT 2 = 0, and CONT 3 = 1. This signal of CONT0, CONT1, CONT2, and CONT3 is outputted to each of the copy counter 7 for service maintenance persons in charge contained inside the display 6 and image formation equipment which were installed on the control panel for users which is not illustrated from the costs value calculation section 5, and the key counter 8 inserted in image formation equipment by the user in case it is used (S58).

[0192] Now, if a signal is inputted into a display 6 from CONT0, CONT1, CONT2, and CONT3, as shown in drawing 20, the LED lighting circuits 30a, 30b, 30c, and 30d will drive, and any one [ LED / 31a 31b, 31c, and 31d / corresponding to CONT0, CONT1, CONT2, and CONT3 ] will light up, respectively. the label 32 written to be "a running cost display" beside this LED group -- and -- "-- label 33a of full color:4 time" -- "line drawing color : Label 33b of twice", "standard" label 33c for monochrome; , "-- monochrome: -- the case where label 33d of smallness" is stuck and it is the above-mentioned A -- "-- LED31a beside label 33a of full color:4 time" the case of B) -- "-- line drawing color: -- LED31b beside label 33b of twice" the case of C) -- "-- monochrome: -- LED31c beside label 33c of standard" the case of D) -- "-- monochrome: -- LED31d of label 33d [ of smallness" ] width lights up, and it indicates that a costs [ manuscript / which is installed in the image reading section ] setup according to it is made to a user by the classification of each \*\*\*\*\* (S59). In the copy counter 7, the signal of CONT0, CONT1, CONT2, and CONT3 is inputted into a register 40, and the costs values 4, 2, 1, and 0 corresponding to Above A, B, C, and D are outputted. This costs value is added to the costs value [ finishing / storing in EEPROM42 ] till then by the adder 711, and the updated value is stored again. Moreover, the value of this EEPROM42 can be checked with a liquid crystal display 43, in case a service maintenance person in charge asks a user for a toll (S60). On the other hand, in the key counter 8, according to the program registered into PROM54, the signal of CONT0, CONT1, CONT2, and CONT3 from the costs value calculation section is incorporated by CPU53 through a terminal area 50 and the interface section 52, and after being added to the value already written in EEPROM42, it is again stored in EEPROM42. Moreover, the stored value is displayed on a drop 51 (S61).

[0193] On the other hand,  $\sigma Y$  from the article-of-consumption calculation section 4,  $\sigma M$ ,  $\sigma C$ , the value of  $\sigma K$ , and the costs value from the costs value calculation section 5 are inputted into the statistics processing section 9, and are stored with the output value which expresses a /part / second with the information memory 910 there at the time of year / moon / day/of a timer 901.

[0194] Drawing 32 is an example which showed the storing gestalt, for example,  $\sigma Y$ ,  $\sigma M$ ,  $\sigma C$ , the value of  $\sigma K$ , 100, 60, 40 and 30, and the costs value 4 are linked to a data number 132 with time amount 95/09/30/16/54/57, and it is stored in it.

[0195] According to the statistics processing program stored in program memory 920, the main control section 940 carries out statistics processing of the data of the information memory 910, and carries-out-sequential-storing-at-the-statistics-data-memory 930. As one of the statistics processings, the cumulative value of various information is calculated by the following formulas.  
[0196]



Here, the cumulative value of all the data stored in information memory is calculated by making into the minimum value 1 of a data number the data number and A in which i was stored by information memory, and making B into the maximum of a data number, i.e., the data number of the newest time of day. This information data is that a serviceman does memory access at the time of a maintenance, and turns into information data corresponding to a maintenance cycle. Here, the accumulating totals of a costs value are called for by transposing to the costs value in which the consumption accumulation value of an article-of-consumption toner, Y accumulating totals, M accumulating totals, C accumulating totals, and K accumulating totals can be found by replacing the part of (X) of a formula (20) with  $\sigma Y$ ,  $\sigma M$ ,  $\sigma C$ , and  $\sigma K$ , and (X) of (20)-types is stored by the information memory 910.

[0197] As a statistic of another kind, the accumulation value for every fixed time amount can also be calculated. For example, its attention is paid to the 3rd partition eye of the hour entry stored in the information memory 910. If  $\sigma Y$ ,  $\sigma M$ ,  $\sigma C$ , and  $\sigma K$  and the costs value equivalent to data number i are accumulated about the continuation data in which the 3rd partition has the same value, the cumulative value or costs value accumulating totals of the article-of-consumption toner consumed on the same day can be found. For example, in drawing 32, if the continuation data which have the figure 30 in the 3rd partition of a hour entry are looked for, even data numbers 129-132 will correspond to it, for example, the accumulating totals of the costs value of the day will be set to  $2+2+4+4=12$ . If its attention is similarly paid to the 4th partition of time amount, if its attention is paid to the 2nd partition, it will become the accumulating totals in every hour with monthly accumulating totals. If it divides and accumulates also with the value with the 3rd still more nearly same partition when the 4th partition is larger than 12, and when small, the accumulating totals divided in the morning and the afternoon will be attained.

[0198] Moreover, it can also ask for the copy number of sheets for every fixed time amount according to the class of manuscript. If the hour entry of data numbers 129 and 130 is seen, it is only a part equivalent to the second of the 6th partition, and, as for the difference, amount  $\sigma Y$  of an article-of-consumption toner,  $\sigma M$ ,  $\sigma C$ ,  $\sigma K$ , and a costs value also show the same value. Although this shows that 129 and 130 are the continuation copies by the same manuscript, the data number supports one copy at a time in this way. Then, counting of copy number of sheets becomes possible by carrying out counting of the data number of cases for every value of a costs value about the retrieval of 1 day by day which paid its attention to the 3rd above-mentioned partition of a hour entry. For example, if even the continuation data 129-132 with the figure of 30 of the 3rd partition of the hour entry of drawing 32 are received and counting of the data number of cases for every costs value is carried out, nothing and the costs value 2 will be the forms of two affairs of data numbers 131 and 132 in two affairs of data numbers 129 and 130, and the costs value 4, and counting of the costs value 1 will be carried out according to the costs value with which the copy number of sheets on September 30, 95 corresponds according to the class of manuscript.

[0199] Furthermore, the average can also be calculated as a statistic of another kind. This is called for by doing the division of the various above-mentioned cumulative values with the number of data.

[0200]

Average = accumulating-totals/(B-A) -- Formula (21)

By making the output from a timer 901 into a trigger, for every [ every fixed time amount and ] hour, data processing of these statistics processings is carried out by the main control section



940, and they are stored in the statistics data memory 930 in the form which rewrites data.

[0201] The communication link unit 61 is started with the built-in timer 1082 at every fixed time amount, midnight when 1 time and a communication link tariff will be cheap on 1, and it becomes irregular to the sound signal of the data format which was suitable for the transfer with modulator and demodulator 1085, and it is sent out to a public line 63 through a network control section while it receives the data stored in the statistics data memory 930 through a communication interface 1084. In addition, when proved that it is the device by which a transmitting partner treats image data, such as facsimile, by the network control section, it can change into the character with a pattern generator 1083, and can also output.

~~[0202] It is received through the network control section 1092 of an external device 62, and this sound signal is changed into the original statistical data by modulator and demodulator 1093, and is stored in a processor 1094 1094-4, for example, storage, such as a floppy disk. Moreover, it is also possible to start data transfer by the data demand from an external device 62. In this case, the demand signal from the processor 1094 of an external device 62 is modulated to a sound signal by modulator and demodulator 1093, and it transmits to a public line 63 through the network control section 1092. The communication link unit 61 restores to the sound signal from a public line 63 by modulator and demodulator 1085 through the network control section 1086, and starts the communications control section through a communication interface. Subsequent data transfer is the same as \*\*\*\*.~~

[0203] The various statistical datas stored in the processor 1094 of an external device 62 are graph-ized by the data-processing program of a processor 1094, and are outputted to the airline printers 1094-3, such as the displays 1094-2, such as a display, and a printer.

[0204] The case where the monthly copy number of sheets classified by costs value shown in drawing 27 is expressed as a line graph as 1st example of an output is explained. In this example, it turns out that the copy of a full color manuscript [ like a upward tendency, i.e., natural drawing, ] whose copy number of sheets of the costs value 4 is is increasing. By the full color copy, there is also much amount of the article of consumption used, and it becomes possible to cope with it from toner scattering within an airframe etc. increasing, before it is better to increase the frequency of a service maintenance and the claim from a user comes. Moreover, the detailed graph for every week can also be created in the form of drawing 27 day by day, and in that case more precise and quick management is attained.

[0205] Moreover, the monthly copy number-of-sheets data for every costs value shown in drawing 27 can be used as data of the copy cost claim to a user. Although the claim amount of money to a user serves as a value which added four sorts of monthly costs values, the bill with which conviction goes can be drawn up by filling in the copy number of sheets for four sorts of every manuscript classification as a detail of the claim. Moreover, by this monthly claim amount of money being obtained, a serviceman cannot visit a user but can also liquidate \*\* using the automatic accounts transfer of a bank account etc. There is little especially copy number of sheets, and when a maintenance is unnecessary, it is effective.

[0206] As 2nd example of an output, every day of the week and the copy number of sheets for every costs value can also be indicated by the bar graph like drawing 28 . This graph is utilizable for judging the working day of a service maintenance. Since a user's copying machine use will be interrupted during the activity of a service maintenance, it is necessary to choose few [ a user's operating frequency ] days. In the example of drawing 28 , it is not used at all on Saturday and Sunday, and it turns out on Tuesday and Thursday that operating frequency is low. Moreover, when Tuesday is compared with Thursday, even if copy number of sheets is almost the same,



there are many copies of the costs values 2 and 4, i.e., a color copy, on Thursday. With the so-called color copying machine of 4 rotary-system electrophotography record which obtains a color picture by four rotations, the operating time of a copying machine becomes a \*\*\*\*\* from a color copy requiring about 4 times as much time amount as a monochrome copy in that case compared with Tuesday using one photo conductor on Thursday. Therefore, Thursday with little copy number of sheets etc. will be mentioned as a candidate one by one on Tuesday with little operating time of a machine on Saturday which is not used at all and Sunday as a candidate day of the week of a service maintenance.

[0207] On the other hand, the maintenance timing doubled with a user's needs can also be considered. By the copy of a monochrome manuscript, or the copy of the color copy of an alphabetic character / line drawing subject, although the demand about a color tone is not so high, in the case of a copy of a full color manuscript like natural drawing, it cares about a tint in many cases. In the example of drawing 28, in order to concentrate on Friday and to realize color reproduction faithful at the time of these use, Thursday understands that it is desirable to perform a service maintenance for the copy of the full color manuscript equivalent to the costs value 4. Although considered as the one-week display for every day of the week in this example, it is possible similarly to decide monthly maintenance timing similarly as an one-month display for every day by day or half a day.

[0208] As 3rd example of an output, daily article-of-consumption accumulating totals can be displayed by the line graph like drawing 29. This is useful to determining the delivery stage of an article-of-consumption toner. Although the article-of-consumption toner is contained by the cartridge and the bolt and a user and a key operator generally supply it timely, in order to use the toner of four colors, in a color copying machine, four kinds of cartridges and two or more bolts will be reserved. Although copying cannot but become impossible and a serviceman must be called if at least one of them becomes insufficient, it becomes useless [ a tooth space ] to reserve many cartridges and bolts. In the example of drawing 29, since it has supplied two toner bolts each as a reserve at the time of the last service maintenance and K accumulating totals serve as a value near toner 2 duty as of 12 days, it turns out that delivery of K color toner is needed. Moreover, if used at a rate of this as, it can predict having consumed in 2 more - three days. Furthermore, the cumulative value data of other colors are utilizable also as that decision ingredient which should supply the bottle of other colors at the time of the user visit.

[0209] As 4th example of an output, as shown in drawing 35, the amount of consumption of the toner of four colors is displayed according to every month with the bar graph. This is useful to predicting the toner of which is supplied at the time of a visit. Since the consumption of all of the toner of four colors in August is decreasing to abbreviation one half in this example, the supply control of eye bracing of reducing the cartridge of a toner and supply of a bottle by half at the time of a visit of the user before August comes around etc. is possible. Moreover, there is much consumption of K color toner by the monochrome manuscript copy it is guessed that is a sake at the end of a fiscal year in March, and it consumes also twice [ about ] to the order moon. Then, supply control of doubling the cartridge of K color toner and supply of a bottle at the time of the user visit before March comes around is possible. Similarly, September, the cartridge and bottle of a toner of twice [ about ] and K color can supply about 3 times in advance, and the cartridge and bottle of a toner of Y color, M color, and C color can prevent the excess and deficiency of article-of-consumption supply. Therefore, a more efficient service maintenance can be performed by such a graph being obtained.

[0210] In addition, although the data transmitted through a public line 63 were made into the



statistical data in which it was stored by the statistics data memory 930 of the statistics processing section 9 in this example. The data number in which this was stored by the information memory 910, a hour entry, sigmaY, The statistics processing which was good also as all information data of sigmaM, sigmaC, sigmaK, and a costs value, and was calculated in information storage / processing section in that case. The processor 1094 should just be equipped with the configuration realizable [ with the processor 1094 of an external device 62 ], i.e., the thing equivalent to the main control section 940 and program memory 920.

[0211] Moreover, the example described above can carry out deformation application in the range which does not deviate from the main point. For example, after showing a user a costs value and obtaining comprehension before carrying out hard copy actuation, it is possible to also make actuation start, and added value is high. This is realized by the following deformation.

[0212] Although record (S54) at the color picture Records Department 3 was performed in the 1st example of drawing 26 when it computed the value of sigmaY, sigmaM, sigmaC, and sigmaK for every pixel. As shown in drawing 30, the operation of sigmaY, sigmaM, sigmaC, and sigmaK is completed (S56, S57). A costs value is computed (S58), the actuation which checks the depression of the copy initiation key by the user after LED which shows a costs value by the display 6 on a control panel lights up (S59) is added, and it is considering as what is recorded after the check (S60) (S61). Output actuation will be started, after showing the user the costs value and obtaining comprehension of a user by this, before starting actuation of a hard copy output. Although S61 can carry out an immediate execute if a means to store the color picture data for one screen in the image recording section 3 is established at this time. As shown in drawing 31 to the image recording section 3 without an are recording means, color picture data are received once which will be involved color picture reading section 1 (S102). Changing and (S103) recording on Y, M, C, and K data, (S104) image reading at the time of costs value calculation serves as a PURISU can without an image output substantially.

[0213] It can choose realistic to set [ which to be also able to set up setting up a costs value freely as another modification, and is easy to be accepted in a user ] up.

[0214] The 1st example explained a costs setup as fixed asset to net worth ratio of 1, 2, and 4 to A, B, and C. However, by the so-called 4 ream process electrophotography record which has 4 sets of activity means which consist of a photo conductor, a development counter, etc. as image recording equipment 3, it is thought that only the consumption of the toner which is color material increases.

[0215] Drawing 36 is the table showing the costs value at the time of using 4 rotating-type color picture formation equipment of this invention. furthermore, two kinds such as the thing (0) of the smallness of monochrome, and a criterion (1) -- thinking -- further -- a color line drawing (2) -- full color -- (3) is added and the amount of the toner used in four kinds is examined. 4 times full color [ in twice and a line drawing color (2) ] as an example, when this is made into one unit, ~~having used monochrome smallness (0) as c for the amount of the toner used at monochrome (1)~~ -- the case of 20 times is shown to drawing 36 by (3). Consequently, if the service labor cost d, Margin e, etc. are included, if it is monochrome (0), costs value (0) = a+b+c+d+e will be calculated as a result, for example. in this case -- it should observe -- in the so-called 4 rotary-system electrophotography record, based on that method, there is little consumption (b) of the photo conductor part in monochrome, and it differs from consumption (4b) of a color. A setup of such a costs value writes the above-mentioned formula for the drop 6 and the copy counter 7 on a control panel in PROM54 beforehand as the same configuration as the key counter 8, and should just calculate it by CPU53.



[0216] A \*\*\*\* "is contained, as for a photo conductor etc." for a photo conductor drum to be exchanged, a developer, the vertical heating roller for fixing, the blade for cleaning, char DOWAIYA, etc. periodically, and cost is sigma (article-of-consumption value / article-of-consumption LIFE) which totaled the value which broke worth of each part article by the LIFE (exchange cycle). Moreover, a "service labor cost" is the value which converted into the cost per sheet the labor cost of the serviceman who requires for routine inspection, failure correction, and an overhaul procedure including exchange of the above-mentioned article of consumption. A "margin" is the value which converted operating profit into the cost per sheet similarly.

[0217] Moreover, these values can be changed for every dealer. For this reason, modification of --such-a-value (parameter)-is-attained-from-the-keyboard-102-of-a-control-panel 101, and 103 grades-in-inputting a new numeric value if needed.

[0218] Moreover, modification of this parameter from external device 62 grade is further attained through a public line 63 using the above-mentioned communication link unit 61.

[0219] Moreover, drawing 37 is the table showing the costs value at the time of using 4 ream type color picture formation equipment of this invention. the case of four rotating types -- the same -- monochrome smallness (0), a monochrome criterion (1), and a color line drawing (2) -- full color -- the amount of the toner used in four kinds of (3) is examined.

[0220] In this case, since the case where it is called little consumption of the photo conductor of monochrome is not applied like [ in the case of four rotating types ], the costs of a photo conductor with all four same kinds are set up.

[0221] In addition, although the cost of a form was also included in the costs value in these examples, when a form is made into an option, only the part a should set up a costs value low.

[0222] Moreover, the method of thinning out and performing the operation of the article-of-consumption calculation section 4 as another modification is also considered. It aims at the amount of an article of consumption making processing speed ease, and substituting it for the software processing by CPU using a rough value being sufficient, to the operation for every unit pixel of Y, M and C which need this for image formation, and K data. There is no need that input data Y, M, C, and K is by all pixels in drawing 4 , and infanticide which samples 1 pixel for every 40,000 pixels by about 100 sampling to the amount of data of about 4 M bytes / color if good is statistically possible in the image of A3 size, and the resolution of 400dpi.

[0223] Moreover, in operation of this invention, the configuration of the costs value calculation section 5 is not necessarily a required reason. That is, even when not preparing the configuration of the costs value calculation section 5, it cannot be overemphasized that the image formation equipment which can supply the data which realize the increase in efficiency of for example, maintenance business can be offered by carrying out statistics processing of the amount data of consumption from the article-of-consumption calculation section 4 of a toner in the statistics processing section 9, and transmitting this statistical data outside.

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## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1] The block diagram showing roughly the configuration of the image formation equipment concerning the 1st example of this invention.

[Drawing 2] The block diagram showing roughly the configuration of the electric important section of the preceding paragraph of a color transducer.

[Drawing 3] The block diagram showing roughly the configuration of the electric important section of the latter part of a color transducer.

~~[Drawing 4] The block diagram showing roughly the configuration of the electric important section of the article-of-consumption calculation section.~~

[Drawing 5] The block diagram showing roughly the configuration of the electric important section of the costs value calculation section.

[Drawing 6] The block diagram showing the configuration of a display roughly.

[Drawing 7] The block diagram showing the configuration of the electric important section of a copy counter roughly.

[Drawing 8] The conceptual diagram showing the configuration of the register of a copy counter.

[Drawing 9] The perspective view showing the appearance of a key counter.

[Drawing 10] The block diagram showing the configuration of the electric important section of a key counter roughly.

[Drawing 11] The flow chart for explaining processing of the image formation equipment concerning the 1st example of operation

[Drawing 12] The flow chart for explaining processing of the image formation equipment concerning the 2nd example of operation

[Drawing 13] The flow chart for explaining processing of the image formation equipment concerning the 3rd example of operation

[Drawing 14] The block diagram showing roughly the configuration of the image formation equipment concerning the 4th example.

[Drawing 15] Drawing showing roughly the configuration of the color picture input interface section concerning the 4th example.

[Drawing 16] The block diagram showing roughly the configuration of the image formation equipment concerning the 4th example.

[Drawing 17] Drawing showing roughly the configuration of the color picture input interface section concerning the 4th example.

[Drawing 18] The block diagram showing roughly the configuration of the image formation equipment concerning the 5th example of this invention.

~~[Drawing 19] The block diagram showing the configuration of the costs value calculation section roughly.~~

[Drawing 20] The block which shows the configuration of the display concerning the 5th example roughly.

[Drawing 21] The block diagram showing roughly the configuration of the electric important section of the copy counter concerning the 5th example.

[Drawing 22] The conceptual diagram showing the configuration of the register of the copy counter concerning the 5th example.

[Drawing 23] The block diagram showing the configuration of the statistics processing section.



[Drawing 24] The block diagram showing the configuration of a communication link unit.

[Drawing 25] The block diagram showing the configuration of an external device.

[Drawing 26] The flow chart explaining actuation of the image formation equipment concerning one example of this invention.

[Drawing 27] The graph which shows the 1st example of an output of an external device.

[Drawing 28] The graph which shows the 2nd example of an output of an external device.

[Drawing 29] The graph which shows the 3rd example of an output of an external device.

[Drawing 30] The flow chart explaining actuation of the modification of one example of this invention.

~~[Drawing 31] The flow chart explaining supplementary actuation of a modification...~~

~~[Drawing 32] The table showing the information storing gestalt of the information memory of information storage / processing section.~~

[Drawing 33] Drawing of the control panel of the image formation equipment concerning one example of this invention.

[Drawing 34] The block flow diagram of the control panel of drawing 33 .

[Drawing 35] The histogram which showed the consumption of a toner statistically.

[Drawing 36] The table showing the costs value at the time of using 4 rotating-type color picture formation equipment of this invention.

[Drawing 37] The table showing the costs value at the time of using 4 ream type color picture formation equipment of this invention.

[Description of Notations]

1 [ -- The article-of-consumption calculation section, 5 / -- The costs value calculation section, 6 / -- A display, 7 / -- A copy counter, 8 / -- A key counter, 9 / -- The statistics processing section, 40 / -- The color picture input interface section, 61 / -- A communication link unit, 62 / -- An external device, 63 / -- A public line, 101 / -- Control panel. ] -- A color picture read station, 2 -- A color transducer, 3 -- The color picture Records Department, 4



IMAGE FORMING DEVICE  
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Abstract  
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PURPOSE: To provide an image forming device constituted so that the recording speed thereof is high, the set of a price with respect to a user can be made different according to printing ratio and the recording of a using state can be practically used as the index of maintenance and the like.

CONSTITUTION: First color data R, G and B is outputted by reading a set color original by a color image read part 1 and converted into second color data Y, M, C and K corresponding to the color components of a real recording material by a color conversion part 2. Based on the second color data, the consumption of the respective recording material equivalent to one color picture frame is calculated by a consumables calculation part 4. Based on the consumption, the originals are sorted to any one of the nearly monochromatic original, the line-drawing color original and the full-color original by a cost value calculation part 5. Then, a cost value is calculated according to a cost value ratio corresponding to the sorted result and displayed at a display part 6. Besides, the statics of the using quantity of the recording material is taken (9) and the information thereof is provided outside by a communication unit.



[0001]

[Industrial Field of Application] This invention relates to an image forming apparatus which forms a copy image of a color image of, for example, a color copying machine etc.

[0208] As a third output example, as in Fig. 29, it is possible to display consumable good cumulative total every day by a line graph. This is useful for determining a delivery timing of consumable good toner. The consumable good toner is accommodated in a cartridge and a bottle, and in general, a user and a key operation refill it on a timely basis, and since 4 color toners are used in a color copying machine, a plurality pieces of 4 kinds of cartridges and bottles are to be always kept. If even 1 kind thereof goes short, copying becomes unavailable, and we have no other choice than calling a service man, but to always keep many cartridges and bottles becomes waste of a space. In the example of Fig. 29, at previous time of service maintenance, 2 pieces of toner bottles for each are delivered as spare, and at the time of 12-th day, K cumulative total becomes a value which is close to 2 pieces to toners, and therefore, it is understood that delivery of K color toners becomes necessary. Also, when it is used by a rate as it is, it is possible to predict that it is consumed for 2 to 3 days after. Further, cumulative



value data of another color can be utilized as a judgment material of whether a bottle of another color should be delivered at the time of user visit.



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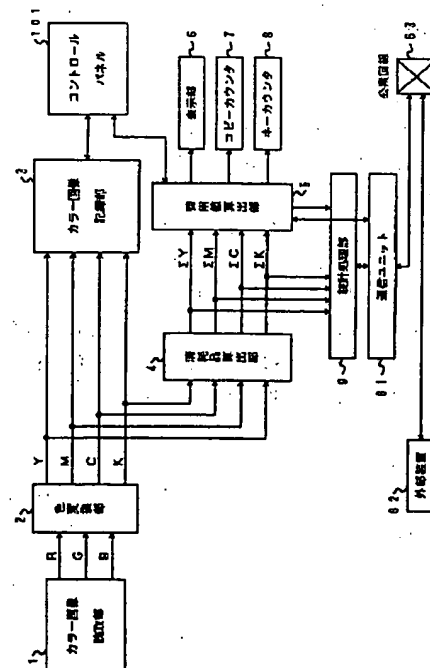
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(54)【発明の名称】 画像形成装置

(57)【要約】

【課題】 記録速度が高速でかつ印字率に応じてユーザに対する値段設定を異ならせることが可能であり、使用記録をメンテナンス等の指針として活用することができる画像形成装置を提供することを課題とする。

【解決手段】 カラー画像読取部1でセットされたカラー原稿を読取って第1の色データR、G、Bを出力し、色変換部2で実際の記録材の色成分に対応する第2の色データY、M、C、Kに変換して、その第2の色データをもとに消耗品算出部4で、カラー画像1画面分の各記録材の消費量を算出して、その消費量をもとに費用値算出部5で、モノクロに近い原稿、線画カラー原稿、フルカラー原稿のいずれかに分類し、その分類に応じた費用値比率に従って費用値を算出して、表示部6に表示したり、記録材の使用量を統計処理9して、この情報を外部に通信ユニット61により提供したりする画像形成装置。





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【特許請求の範囲】

【請求項 1】 カラー画像を読み取ってこのカラー画像の複製画像を形成する画像形成装置において、前記カラー画像を色分解して第 1 のカラー画像データを出力する出力手段と、

この出力手段で出力された前記第 1 のカラー画像データを前記複製画像の形成に使用する記録材の色成分に対応する第 2 のカラー画像データに変換する色変換手段と、この色変換手段で変換された前記第 2 のカラー画像データをもとにして、前記記録材の消費量を算出する消費量算出手段と、

この消費量算出手段で算出された前記記録材の消費量をもとにして、前記カラー画像の費用値を算出する費用値算出手段と、

前記第 2 のカラー画像データをもとに前記カラー画像の複製画像を形成する画像形成手段と、

を具備したことを特徴とする画像形成装置。

【請求項 2】 カラー画像を読み取ってこのカラー画像の複製画像を形成する画像形成装置において、前記カラー画像を色分解して第 1 のカラー画像データを出力する出力手段と、

この出力手段で出力された前記第 1 のカラー画像データを前記複製画像の形成に使用する記録材の色成分に対応する第 2 のカラー画像データに変換する色変換手段と、この色変換手段で変換された第 2 のカラー画像データをもとにして、前記記録材の消費量を算出する消費量算出手段と、

この消費量算出手段で算出された前記記録材の消費量を、あらかじめ定められた複数の段階に分類し、その分類された段階に応じて前記カラー画像の費用値を決定する費用値決定手段と、

前記第 2 のカラー画像データをもとに前記カラー画像の複製画像を形成する画像形成手段と、

を具備したことを特徴とする画像形成装置。

【請求項 3】 カラー画像を読み取ってこのカラー画像の複製画像を形成する画像形成装置において、前記カラー画像を色分解して第 1 のカラー画像データを出力する出力手段と、

この出力手段で出力された前記第 1 のカラー画像データを前記複製画像の形成に使用する記録材の色成分に対応する第 2 のカラー画像データに変換する色変換手段と、この色変換手段で変換された前記第 2 のカラー画像データをもとにして、前記記録材の消費量を算出する消費量算出手段と、

この消費量算出手段で算出された前記記録材の消費量と、前記第 2 のカラー画像データをもとに得られる墨色成分の記録材の消費量との差をもとにして、前記カラー画像の費用値を算出する費用値算出手段と、

前記第 2 のカラー画像データをもとに前記カラー画像の複製画像を形成する画像形成手段と、

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を具備したことを特徴とする画像形成装置。

【請求項 4】 カラー画像を読み取ってこのカラー画像の複製画像を形成する画像形成装置において、前記カラー画像を色分解して第 1 のカラー画像データを出力する出力手段と、

この出力手段で出力された前記第 1 のカラー画像データを前記複製画像の形成に使用する記録材の色成分に対応する第 2 のカラー画像データに変換する色変換手段と、この色変換手段で変換された前記第 2 のカラー画像データを間引いて、この間引きを行った第 2 の画像データをもとにして、前記記録材の消費量を算出する消費量算出手段と、

この消費量算出手段で算出された記録材の消費量をもとにして、前記カラー画像の費用値を算出する費用値算出手段と、

前記第 2 のカラー画像データをもとに前記カラー画像の複製画像を形成する画像形成手段と、

を具備したことを特徴とする画像形成装置。

【請求項 5】 カラー画像を読み取ってこのカラー画像の複製画像を形成する画像形成装置において、前記カラー画像を色分解して第 1 のカラー画像データを出力する出力手段と、

この出力手段で出力された前記第 1 のカラー画像データを前記複製画像の形成に使用する記録材の色成分に対応する第 2 のカラー画像データに変換する色変換手段と、この色変換手段で変換された前記第 2 のカラー画像データをもとにして、前記記録材の消費量を算出する消費量算出手段と、

この消費量算出手段で算出された前記記録材の消費量をもとにして、前記カラー画像の費用値を算出する費用値算出手段と、

この費用値算出手段で算出された費用値を表示する表示手段と、

前記第 2 のカラー画像データをもとに前記カラー画像の複製画像を形成する画像形成手段と、

を具備したことを特徴とする画像形成装置。

【請求項 6】 カラー画像を読み取ってこのカラー画像の複製画像を形成する画像形成装置において、前記カラー画像を色分解して第 1 のカラー画像データを出力する出力手段と、

この出力手段で出力された前記第 1 のカラー画像データを前記複製画像の形成に使用する記録材の色成分に対応する第 2 のカラー画像データに変換する色変換手段と、この色変換手段で変換された前記第 2 のカラー画像データをもとにして、前記記録材の消費量を算出する消費量算出手段と、

この消費量算出手段で算出された前記記録材の消費量をもとにして、前記カラー画像の費用値を算出する費用値算出手段と、

この費用値算出手段で算出された費用値を表示する表示



手段と、

この表示手段で費用値が表示された後に、所定の複製画像の形成実行指示があった場合に、前記第 2 のカラー画像データをもとに前記カラー画像の複製画像を形成する画像形成手段と、

を具備したことを特徴とする画像形成装置。

【請求項 7】 カラー画像を読み取ってこのカラー画像の複製画像を形成する画像形成装置において、前記カラー画像を色分解して第 1 のカラー画像データを出力する出力手段と、

この出力手段で出力された前記第 1 のカラー画像データを前記複製画像の形成に使用する記録材の色成分に対応する第 2 のカラー画像データに変換する色変換手段と、この色変換手段で変換された前記第 2 のカラー画像データをもとにして、前記記録材の消費量を算出する消費量算出手段と、

この消費量算出手段で算出された前記記録材の消費量をもとにして、前記カラー画像の費用値を算出する費用値算出手段と、

この費用値算出手段で算出された費用値を積算して、その積算値を記憶し表示する積算表示手段と、

前記第 2 のカラー画像データをもとに前記カラー画像の複製画像を形成する画像形成手段と、

を具備したことを特徴とする画像形成装置。

【請求項 8】 カラー画像を読み取ってこのカラー画像の複製画像を形成する画像形成装置において、前記カラー画像を色分解して第 1 のカラー画像データを出力する出力手段と、

この出力手段で出力された前記第 1 のカラー画像データを前記複製画像の形成に使用する記録材の色成分に対応する第 2 のカラー画像データに変換する色変換手段と、この色変換手段で変換された前記第 2 のカラー画像データをもとにして、前記記録材の消費量を算出する消費量算出手段と、

この消費量算出手段で算出された前記記録材の消費量をもとにして、前記カラー画像の費用値を算出する費用値算出手段と、

前記装置本体に着脱自在に装着され、前記費用値算出手段で算出された費用値を積算し、その積算値を記憶し表示する積算表示手段と、

を具備したことを特徴とする画像形成装置。

【請求項 9】 通信ネットワークを介して送られるカラー画像の複製画像を形成する画像形成装置において、前記通信ネットワークを介して送られる第 1 のカラー画像データを受信する受信手段と、

この受信手段で受信された前記カラー画像データを前記複製画像の形成に使用する記録材の色成分に対応する第 2 のカラー画像データに変換する色変換手段とこの色変換手段で変換された前記第 2 のカラー画像データをもとにして、前記記録材の消費量を算出する消費量算出手段

と、

この消費量算出手段で算出された前記記録材の消費量をもとにして、前記カラー画像の費用値を算出する費用値算出手段と、

前記第 2 のカラー画像データをもとに前記カラー画像の複製画像を形成する画像形成手段と、

を具備したことを特徴とする画像形成装置。

【請求項 10】 第 1 カラー画像データを読み取って前記第 1 カラー画像データの複製画像を形成する画像形成装置において、

前記第 1 カラー画像データを第 2 カラー画像データに変換する変換手段と、

前記第 2 カラー画像データに基づき記録材を用いて前記第 1 カラー画像の複製画像を形成する画像形成手段と、前記第 2 カラー画像データから前記記録材の消費量を算出する手段と、

前記算出された消費量に基づいて、前記第 1 カラー画像の複製画像の費用値を算出する手段と、

公衆回線を介して外部装置へ前記費用値を送信する手段と、

を具備したことを特徴とする画像形成装置。

【請求項 11】 第 1 カラー画像データを読み取って前記第 1 カラー画像データの複製画像を形成する画像形成装置において、

前記第 1 カラー画像データを第 2 カラー画像データに変換する変換手段と、

前記第 2 カラー画像データに基づき記録材を用いて前記第 1 カラー画像の複製画像を形成する画像形成手段と、前記第 2 カラー画像データから前記記録材の消費量を算出する手段と、

前記算出された消費量に基づいて、前記第 1 カラー画像の複製画像の費用値を算出する手段と、

前記費用値を統計処理して統計処理結果を算出する手段と、

公衆回線を介して外部装置へ前記統計処理結果を送信する手段と、

を具備したことを特徴とする画像形成装置。

【請求項 12】 第 1 カラー画像データを読み取って前記第 1 カラー画像データの複製画像を形成する画像形成装置において、

前記送信手段は、前記記録材の消費量を複数段階に分類したときの、この段階ごとにカウントした画像形成の回数を送信することを特徴とする請求項 10 に記載の画像形成装置。

【請求項 13】 第 1 カラー画像データを読み取って前記第 1 カラー画像データの複製画像を形成する画像形成装置において、

前記送信手段は、前記記録材の消費量を複数段階に分類したときの、この段階ごとに一定時間にカウントした画像形成の回数を送信することを特徴とする請求項 10 に



記載の画像形成装置。

【請求項 14】 第 1 カラー画像データを読み取って前記第 1 カラー画像データの複製画像を形成する画像形成装置において、

前記第 1 カラー画像データを第 2 カラー画像データに変換する変換手段と、

前記第 2 カラー画像データに基づき記録材を用いて前記第 1 カラー画像の複製画像を形成する画像形成手段と、

前記第 2 カラー画像データから前記記録材の消費量を算出する手段と、

前記費用値を統計処理して統計処理結果を算出する手段と、

前記統計処理結果を表示する手段と、

を具備したことを特徴とする画像形成装置。

【請求項 15】 第 1 カラー画像データを読み取って前記第 1 カラー画像データの複製画像を形成する画像形成装置において、

前記第 1 カラー画像データを第 2 カラー画像データに変換する変換手段と、

前記第 2 カラー画像データに基づき記録材を用いて前記第 1 カラー画像の複製画像を形成する画像形成手段と、

前記第 2 カラー画像データから前記記録材の消費量を算出する手段と、

前記消費量を統計処理して統計処理結果を算出する手段と、

公衆回線を介して外部装置へ前記統計処理結果を送信する手段と、

を具備したことを特徴とする画像形成装置。

【請求項 16】 第 1 カラー画像データを読み取って前記第 1 カラー画像データの複製画像を形成する画像形成装置において、

前記第 1 カラー画像データを第 2 カラー画像データに変換する変換手段と、

前記第 2 カラー画像データに基づき記録材を用いて前記第 1 カラー画像の複製画像を形成する画像形成手段と、

前記第 2 カラー画像データから前記記録材の消費量を算出する手段と、

前記消費量を統計処理して一定時間毎の統計処理結果を算出する手段と、

前記統計処理結果を表示する手段と、

を具備したことを特徴とする画像形成装置。

【請求項 17】 第 1 カラー画像データを読み取って前記第 1 カラー画像データの複製画像を形成する画像形成装置において、

前記第 1 カラー画像データを第 2 カラー画像データに変換する変換手段と、

前記第 2 カラー画像データに基づき記録材を用いて前記第 1 カラー画像の複製画像を形成する画像形成手段と、

前記第 2 カラー画像データから前記記録材の消費量を算出する手段と、

前記消費量を統計処理して一定時間毎の統計処理結果を算出する手段と、

公衆回線を介して外部装置へ前記統計処理結果を送信する手段と、

を具備したことを特徴とする画像形成装置。

【請求項 18】 第 1 カラー画像データを読み取って前記第 1 カラー画像データの複製画像を形成する画像形成装置において、

前記第 1 カラー画像データを第 2 カラー画像データに変換する変換手段と、

前記第 2 カラー画像データに基づき記録材を用いて前記第 1 カラー画像の複製画像を形成する画像形成手段と、

前記第 2 カラー画像データから前記記録材の消費量を算出する手段と、

前記消費量を複数段階に分類したときのこの段階ごとにカウントした画像形成の回数を統計処理した統計処理結果を算出する手段と、

前記統計処理結果を表示する手段と、

を具備したことを特徴とする画像形成装置。

【請求項 19】 第 1 カラー画像データを読み取って前記第 1 カラー画像データの複製画像を形成する画像形成装置において、

前記第 1 カラー画像データを第 2 カラー画像データに変換する変換手段と、

前記第 2 カラー画像データに基づき記録材を用いて前記第 1 カラー画像の複製画像を形成する画像形成手段と、

前記第 2 カラー画像データから前記記録材の消費量を算出する手段と、

前記消費量を複数段階に分類したときのこの段階ごとにカウントした画像形成の回数を統計処理した統計処理結果を算出する手段と、

公衆回線を介して外部装置へ前記統計処理結果を送信する手段と、

を具備したことを特徴とする画像形成装置。

【請求項 20】 第 1 カラー画像データを読み取って前記第 1 カラー画像データの複製画像を形成する画像形成装置において、

前記第 1 カラー画像データを第 2 カラー画像データに変換する変換手段と、

前記第 2 カラー画像データに基づき記録材を用いて前記第 1 カラー画像の複製画像を形成する画像形成手段と、

前記第 2 カラー画像データから前記記録材の消費量を算出式を用いて算出する手段と、

外部からの操作により前記算出式のパラメータを変更する手段と、

を具備したことを特徴とする画像形成装置。

【請求項 21】 カラー画像を読み取ってこの複製画像を形成する画像形成装置において、

前記カラー画像データを受信する受信手段と、

前記受信手段が受信した前記カラー画像データに基づき



少なくとも2種類以上の記録材を用いて前記第1カラー画像の複製画像を形成する画像形成手段と、  
前記画像形成手段により使用された前記記録材の各々の消費量を算出する第1算出手段と、  
前記第1算出手段により算出された記録材の消費量に基づいて、前記複製画像の像形成の費用値を算出する第2算出手段と、  
前記第2算出手段にて算出された前記費用値を使用者に知らせる手段と、  
を具備したことを特徴とする画像形成装置。

#### 【発明の詳細な説明】

##### 【0001】

【発明の属する技術分野】 本発明は、例えば、カラー複写機等のカラー画像の複製画像を形成する画像形成装置に関する。

##### 【0002】

【従来の技術】 一般に、カラー原稿は印字率別に大きく3種に分類される。自然画に代表される印字率50%以上の写真・印刷物、グラフ・図形を主体とした数十%程度のプレゼンテーション資料、文字・表主体の10%程度の一般文書の3種類である。

【0003】 従来は身の回りのカラー原稿といえば写真・印刷物しかなかったが、カラーパソコンやカラープリンタの登場によりプレゼンテーション資料がカラー化される様になり、更にそれらカラーOA機器の低廉化により一般文書の文字強調や野線表示にカラーが使われ始めた。従って、カラー原稿の印字率は急激に減ってきているのが現状である。

【0004】 さて、カラー原稿を複製するカラー複写機は、毎分数枚の記録が可能な高速性が買われて電子写真方式が主流となっている。そのランニングコストは1枚当たりの値段で規定されており、印字率の高低には無関係である。これは電子写真複写機が当初は印字率の低い(数%)のモノクロ文字原稿を対象として普及してきたことと、消耗品の光半導体ドラムが短寿命でランニングコストに占める割合が大きかったことから、トナーの消費量にあまり依存せず、1枚当たりのランニングコスト設定となっていた。さらに、カラー原稿を対象とするカラー複写機は、実質的に印字率が高く、またカラートナーの総需要が少ないことから、ランニングコストはモノクロ複写機の数十倍に設定されている。

##### 【0005】

【発明が解決しようとする課題】 このように、記録速度が高速でカラー複写機として十分な性能を持つ電子写真方式等によるカラー複写機においては、その一枚あたりの複写の代金は、カラー原稿の印字率に関わらず、印字率が高いカラー原稿も低いカラー原稿も一定の値段で規定されている。このため、例えば、印字率の低いカラー原稿を複製する場合に実質的なランニングコスト以上のユーザへの価格が設定され請求されてしまうという問題

がある。

【0006】 又、更に、カラー複写機においても、モノクロ複写機と同様に、一定期間毎、あるいはコピー枚数に応じたサービスマンテナンスの方法が採用されている。カラー複写機は、4色のトナーを用いており、また作像プロセスも4ステージ存在するが、各々が使われる頻度は原稿の種類によって大きく異なり、またユーザ毎に原稿の種類が違っているなどから、一律のサービスマンテナンスでは過不足を生じ易い。このため、無駄なメンテナンスや行き届かないメンテナンスの状況が発生しているという問題もある。

【0007】 又更に、複数のユーザによる記録材の使用記録は、メモリ等に記録しておいたとしても、このままの状態ではこの使用記録を例えばメンテナンスの指針として活用することができないという問題もある。

【0008】 そこで、本発明は、記録速度が高速でかつ印字率に応じてユーザに対する値段設定を異ならせることが可能であり、使用記録をメンテナンス等の指針として活用することができる画像形成装置を提供することを目的とする。

##### 【0009】

【課題を解決するための手段】 本発明の画像形成装置は、カラー画像を読み取ってこのカラー画像の複製画像を形成する画像形成装置において、前記カラー画像を色分解して第1のカラー画像データを出力する出力手段と、この出力手段で出力された前記第1のカラー画像データを前記複製画像の形成に使用する記録材の色成分に対応する第2のカラー画像データに変換する色変換手段と、この色変換手段で変換された前記第2のカラー画像データをもとにして、前記記録材の消費量を算出する消費量算出手段と、この消費量算出手段で算出された前記記録材の消費量をもとにして、前記カラー画像の費用値を算出する費用値算出手段と、前記第2のカラー画像データをもとに前記カラー画像の複製画像を形成する画像形成手段とを具備している。

【0010】 また、本発明の画像形成装置は、カラー画像を読み取ってこのカラー画像の複製画像を形成する画像形成装置において、前記カラー画像を色分解して第1のカラー画像データを出力する出力手段と、この出力手段で出力された前記第1のカラー画像データを前記複製画像の形成に使用する記録材の色成分に対応する第2のカラー画像データに変換する色変換手段と、この色変換手段で変換された第2のカラー画像データをもとにして、前記記録材の消費量を算出する消費量算出手段と、この消費量算出手段で算出された前記記録材の消費量を、あらかじめ定められた複数の段階に分類し、その分類された段階に応じて前記カラー画像の費用値を決定する費用値決定手段と、前記第2のカラー画像データをもとに前記カラー画像の複製画像を形成する画像形成手段とを具備している。



【0011】また、本発明の画像形成装置は、カラー画像を読み取ってこのカラー画像の複製画像を形成する画像形成装置において、前記カラー画像を色分解して第1のカラー画像データを出力する出力手段と、この出力手段で出力された前記第1のカラー画像データを前記複製画像の形成に使用する記録材の色成分に対応する第2のカラー画像データに変換する色変換手段と、この色変換手段で変換された前記第2のカラー画像データをもとにして、前記記録材の消費量を算出する消費量算出手段と、この消費量算出手段で算出された前記記録材の消費量と、前記第2のカラー画像データをもとに得られる墨色成分の記録材の消費量との差をもとにして、前記カラー画像の費用値を算出する費用値算出手段と、前記第2のカラー画像データをもとに前記カラー画像の複製画像を形成する画像形成手段とを具備している。

【0012】また、本発明の画像形成装置は、カラー画像を読み取ってこのカラー画像の複製画像を形成する画像形成装置において、前記カラー画像を色分解して第1のカラー画像データを出力する出力手段と、この出力手段で出力された前記第1のカラー画像データを前記複製画像の形成に使用する記録材の色成分に対応する第2のカラー画像データに変換する色変換手段と、この色変換手段で変換された前記第2のカラー画像データを間引いて、この間引きを行った第2の画像データをもとにして、前記記録材の消費量を算出する消費量算出手段と、この消費量算出手段で算出された記録材の消費量をもとにして、前記カラー画像の費用値を算出する費用値算出手段と、前記第2のカラー画像データをもとに前記カラー画像の複製画像を形成する画像形成手段とを具備している。

【0013】また、本発明の画像形成装置は、カラー画像を読み取ってこのカラー画像の複製画像を形成する画像形成装置において、前記カラー画像を色分解して第1のカラー画像データを出力する出力手段と、この出力手段で出力された前記第1のカラー画像データを前記複製画像の形成に使用する記録材の色成分に対応する第2のカラー画像データに変換する色変換手段と、この色変換手段で変換された前記第2のカラー画像データをもとにして、前記記録材の消費量を算出する消費量算出手段と、この消費量算出手段で算出された前記記録材の消費量をもとにして、前記カラー画像の費用値を算出する費用値算出手段と、この費用値算出手段で算出された費用値を表示する表示手段と、前記第2のカラー画像データをもとに前記カラー画像の複製画像を形成する画像形成手段とを具備している。

【0014】また、本発明の画像形成装置は、カラー画像を読み取ってこのカラー画像の複製画像を形成する画像形成装置において、前記カラー画像を色分解して第1のカラー画像データを出力する出力手段と、この出力手段で出力された前記第1のカラー画像データを前記複製

画像の形成に使用する記録材の色成分に対応する第2のカラー画像データに変換する色変換手段と、この色変換手段で変換された前記第2のカラー画像データをもとにして、前記記録材の消費量を算出する消費量算出手段と、この消費量算出手段で算出された前記記録材の消費量をもとにして、前記カラー画像の費用値を算出する費用値算出手段と、この費用値算出手段で算出された費用値を表示する表示手段と、この表示手段で費用値が表示された後に所定の複製画像の形成実行指示があった場合に、前記第2のカラー画像データをもとに前記カラー画像の複製画像を形成する画像形成手段とを具備している。

【0015】また、本発明の画像形成装置は、カラー画像を読み取ってこのカラー画像の複製画像を形成する画像形成装置において、前記カラー画像を色分解して第1のカラー画像データを出力する出力手段と、この出力手段で出力された前記第1のカラー画像データを前記複製画像の形成に使用する記録材の色成分に対応する第2のカラー画像データに変換する色変換手段と、この色変換手段で変換された前記第2のカラー画像データをもとにして、前記記録材の消費量を算出する消費量算出手段と、この消費量算出手段で算出された前記記録材の消費量をもとにして、前記カラー画像の費用値を算出する費用値算出手段と、この費用値算出手段で算出された費用値を積算して、その積算値を記憶し表示する積算表示手段と、前記第2のカラー画像データをもとに前記カラー画像の複製画像を形成する画像形成手段とを具備している。

【0016】また、本発明の画像形成装置は、カラー画像を読み取ってこのカラー画像の複製画像を形成する画像形成装置において、前記カラー画像を色分解して第1のカラー画像データを出力する出力手段と、この出力手段で出力された前記第1のカラー画像データを前記複製画像の形成に使用する記録材の色成分に対応する第2のカラー画像データに変換する色変換手段と、この色変換手段で変換された前記第2のカラー画像データをもとにして、前記記録材の消費量を算出する消費量算出手段と、この消費量算出手段で算出された前記記録材の消費量をもとにして、前記カラー画像の費用値を算出する費用値算出手段と、前記装置本体に着脱自在に装着され、前記費用値算出手段で算出された費用値を積算し、その積算値を記憶し表示する積算表示手段とを具備している。

【0017】さらに、本発明の画像形成装置は、通信ネットワークを介して送られるカラー画像の複製画像を形成する画像形成装置において、前記通信ネットワークを介して送られる第1のカラー画像データを受信する受信手段と、この受信手段で受信された前記カラー画像データを前記複製画像の形成に使用する記録材の色成分に対応する第2のカラー画像データに変換する色変換手段



と、この色変換手段で変換された前記第2のカラー画像データをもとにして、前記記録材の消費量を算出する消費量算出手段と、この消費量算出手段で算出された前記記録材の消費量をもとにして、前記カラー画像の費用値を算出する費用値算出手段と、前記第2のカラー画像データをもとに前記カラー画像の複製画像を形成する画像形成手段とを具備している。

【0018】本発明は、上記の構造により、従来のようにどのような複製画像の像形成が行われても、一律に一定の金額を顧客に対して請求していたのに対して、きめ細かな請求金額の設定を行なう画像形成装置である。つまり、像形成の度に、どの程度の量の記録材が使用されたかを算出し、この記録材の量にもとづいて段階的な料金設定を行うので、例えば、ほとんどがモノクロでしかない原稿画像の複写などは、各色記録材をふんだんに使用したフルカラー印刷に比べ、非常に記録材の消耗が少ないため、適切な請求金額の設定を可能とすることができる。

【0019】又、本発明の画像形成装置は、第1カラー画像データを読み取って前記第1カラー画像データの複製画像を形成する画像形成装置において、前記第1カラー画像データを第2カラー画像データに変換する変換手段と、前記第2カラー画像データに基づき記録材を用いて前記第1カラー画像の複製画像を形成する画像形成手段と、前記第2カラー画像データから前記記録材の消費量を算出する手段と、前記算出された消費量に基づいて、前記第1カラー画像の複製画像の費用値を算出する手段と、前記費用値を統計処理して統計処理結果を算出する手段と、公衆回線を介して外部装置へ前記統計処理結果を送信する手段と、を具備したことを特徴とする画像形成装置である。

【0020】本発明は、上記の構造により、単に適正な顧客に対する請求金額を設定するにとどまらず、記録材の消費量データ統計処理し、公衆回線等を用いて外部に供給し、これを活用してメンテナンス等の作業の合理化を可能とする画像形成装置を提供する。

【0021】つまり、上記構造によって、記録材の消費量を記録し、この消費量に基づく統計的処理によって統計データを作成する。そして、この統計データを外部の例えばパーソナルコンピュータやデータベース等の装置に供給することで、メンテナンス等の際に、オペレータは、例えば、月ごとの記録材の消費具合をこのパーソナルコンピュータ等から参照することが可能となる。こうすることで、従来、一律に行っていた記録材の交換作業等のメンテナンス業務も、実際の記録材の消費程度に応じた効率的かつ合理的なものに改善することが可能となる。

【0022】又、本発明の画像形成装置は、第1カラー画像データを読み取って前記第1カラー画像データの複製画像を形成する画像形成装置において、前記送信手段

は、前記記録材の消費量を複数段階に分類したときの、この段階ごとにカウントした画像形成の回数を送信することを特徴とする請求項10に記載の画像形成装置である。

【0023】又、本発明の画像形成装置は、第1カラー画像データを読み取って前記第1カラー画像データの複製画像を形成する画像形成装置において、前記送信手段は、前記記録材の消費量を複数段階に分類したときの、この段階ごとに一定時間にカウントした画像形成の回数を送信することを特徴とする請求項10に記載の画像形成装置である。

【0024】又、本発明の画像形成装置は、第1カラー画像データを読み取って前記第1カラー画像データの複製画像を形成する画像形成装置において、前記送信手段は、前記記録材の消費量を複数段階に分類したときの、この段階ごとに一定時間にカウントした画像形成の回数を送信することを特徴とする請求項10に記載の画像形成装置である。

【0025】これにより、カラー／モノクロ等の原稿種別に対するコピー枚数データを得られ、リーズナブルなコピー料金の請求が可能となる。又、データが統計量に変換されるので、送信するデータの量が少なくて済み、回線使用時間及び使用料が少なくなる。

【0026】又、本発明の画像形成装置は、第1カラー画像データを読み取って前記第1カラー画像データの複製画像を形成する画像形成装置において、前記第1カラー画像データを第2カラー画像データに変換する変換手段と、前記第2カラー画像データに基づき記録材を用いて前記第1カラー画像の複製画像を形成する画像形成手段と、前記第2カラー画像データから前記記録材の消費量を算出する手段と、前記費用値を統計処理して統計処理結果を算出する手段と、前記統計処理結果を表示する手段と、を具備したことを特徴とする画像形成装置である。

【0027】これにより、消耗品の消耗量に関する統計情報を表示可能とし、4色の消耗品トナーを過不足なく供給することができる。

【0028】又、本発明の画像形成装置は、第1カラー画像データを読み取って前記第1カラー画像データの複製画像を形成する画像形成装置において、前記第1カラー画像データを第2カラー画像データに変換する変換手段と、前記第2カラー画像データに基づき記録材を用いて前記第1カラー画像の複製画像を形成する画像形成手段と、前記第2カラー画像データから前記記録材の消費量を算出する手段と、前記消費量を統計処理して統計処理結果を算出する手段と、公衆回線を介して外部装置へ前記統計処理結果を送信する手段と、を具備したことを特徴とする画像形成装置である。

【0029】これにより、外部装置に送信された消耗品の消耗量の情報をメンテナンス時期決定に活用し、4色



の消耗品トナーを過不足なくタイムリーに供給できる。

【0030】又、本発明の画像形成装置は、第1カラー画像データを読み取って前記第1カラー画像データの複製画像を形成する画像形成装置において、前記第1カラー画像データを第2カラー画像データに変換する変換手段と、前記第2カラー画像データに基づき記録材を用いて前記第1カラー画像の複製画像を形成する画像形成手段と、前記第2カラー画像データから前記記録材の消費量を算出する手段と、前記消費量を統計処理して一定時間毎の統計処理結果を算出する手段と、前記統計処理結果を表示する手段と、を具備したことを特徴とする画像形成装置である。

【0031】これにより、消耗品の一定時間毎の消費累積値を表示可能とし、ユーザーの使用時間帯を避けてメンテナンス時間帯を選択できる。

【0032】又、本発明の画像形成装置は、第1カラー画像データを読み取って前記第1カラー画像データの複製画像を形成する画像形成装置において、前記第1カラー画像データを第2カラー画像データに変換する変換手段と、前記第2カラー画像データに基づき記録材を用いて前記第1カラー画像の複製画像を形成する画像形成手段と、前記第2カラー画像データから前記記録材の消費量を算出する手段と、前記消費量を統計処理して一定時間毎の統計処理結果を算出する手段と、公衆回線を介して外部装置へ前記統計処理結果を送信する手段と、を具備したことを特徴とする画像形成装置である。

【0033】これにより、外部装置に送信された消耗品の一定時間毎の消耗量の情報をメンテナンス時期決定に活用することを可能とする。

【0034】又、本発明の画像形成装置は、第1カラー画像データを読み取って前記第1カラー画像データの複製画像を形成する画像形成装置において、前記第1カラー画像データを第2カラー画像データに変換する変換手段と、前記第2カラー画像データに基づき記録材を用いて前記第1カラー画像の複製画像を形成する画像形成手段と、前記第2カラー画像データから前記記録材の消費量を算出する手段と、前記消費量を複数段階に分類したときのこの段階ごとにカウントした画像形成の回数を統計処理した統計処理結果を算出する手段と、前記統計処理結果を表示する手段と、を具備したことを特徴とする画像形成装置である。

【0035】これにより、消耗品の一定時間毎の消費累積値を少なくとも2種類以上の原稿種類毎に表示可能とすることができる。

【0036】又、本発明の画像形成装置は、第1カラー画像データを読み取って前記第1カラー画像データの複製画像を形成する画像形成装置において、前記第1カラー画像データを第2カラー画像データに変換する変換手段と、前記第2カラー画像データに基づき記録材を用いて前記第1カラー画像の複製画像を形成する画像形成手

段と、前記第2カラー画像データから前記記録材の消費量を算出する手段と、前記消費量を複数段階に分類したときのこの段階ごとにカウントした画像形成の回数を統計処理した統計処理結果を算出する手段と、公衆回線を介して外部装置へ前記統計処理結果を送信する手段と、を具備したことを特徴とする画像形成装置である。

【0037】これにより、外部装置に送信された原稿種類毎の消耗品の一定時間毎の消耗量の情報をメンテナンス時期決定に活用することができる。

【0038】又、本発明の画像形成装置は、第1カラー画像データを読み取って前記第1カラー画像データの複製画像を形成する画像形成装置において、前記第1カラー画像データを第2カラー画像データに変換する変換手段と、前記第2カラー画像データに基づき記録材を用いて前記第1カラー画像の複製画像を形成する画像形成手段と、前記第2カラー画像データから前記記録材の消費量を算出式を用いて算出する手段と、外部からの操作により前記算出式のパラメータを変更する手段と、を具備したことを特徴とする画像形成装置である。

【0039】これにより、ディーラ毎、販売店毎、あるいはユーザー毎に費用値の設定方法を変更可能とすることができる。

【0040】

【発明の実施の形態】以下、本発明の実施例について図面を参照して説明する。

【0041】図1は、本実施例の画像形成装置の構成を概略的に示すものである。カラー画像読取部1は、例えば、CCDスキャナ等で、原稿となるカラー画像を縦横に分割した単位画素毎に、物体光をR（レッド）、G（グリーン）、B（ブルー）の光の3原色に応じた電気信号に変換し、各画素毎に各々8ビットのデジタルデータ、すなわち、それぞれ第1の色データR、G、Bとして出力するものである。

【0042】色変換部2は画素毎に入力されるRGB各8ビットの第1の色データを、インキの3原色であるY（イエロー）、M（マゼンタ）、C（シアン）および、K（ブラック）の色材（記録材）の量に相当する、それぞれ8ビットのデータである第2の色データY、M、C、Kに変換して出力するものである。

【0043】カラー画像記録部3は、第2の色データY、M、C、Kに応じた量のYMCK各色材を用紙に付着させてハードコピー出力するものである。

【0044】一方、第2の色データY、M、C、Kは消耗品算出部4へ導かれ、カラー画像1画面分の消耗品（色材、すなわち、インク）の量が算出されるようになっている。

【0045】費用値算出部5は色材YMCKの1画面分の消耗品の量をもとに、予め設定された費用値比率に従って複数段階の費用値（いわゆる顧客への請求額）を出力するものである。



【0046】表示部6は、本装置の図示しないユーザ用のコントロールパネル上に設置された液晶パネルあるいはLED（発光ダイオード）アレイであり、費用値を表示するものである。

【0047】コピーカウンタ7は、コントロールパネル上あるいは装置内部に設置された機械式回転計数器あるいは不揮発性メモリと液晶等の表示器を組合せたものであり、カラー画像記録部3で1枚のハードコピー出力をする毎にその費用値に応じて計数値を繰り上げて行くものである。

【0048】キーカウンタ8は、本装置に対して着脱可能な計数器であり、コピーカウンタ7と同様の機械式回転計数器あるいは不揮発性メモリと液晶等の表示器を組合せたものであり、装置に装着されて、カラー画像記録部3からハードコピー出力がなされると、その費用値に応じて計数値が繰り上がるものである。

【0049】次に、図2を参照して色変換部2について説明する。

【0050】一般に、カラー画像読取部1から得られる光の3原色RGBのデータ、すなわち、第1の色データR、G、Bをカラー記録装置の色材量を制御するインキの3原色のデータy（イエロー）、m（マゼンタ）、c（シアン）に変換する色修正処理の方法としては、マスキング方程式が使われる。その基本式は下記数1によって表される。

【0051】

【数1】

$$\begin{pmatrix} c \\ m \\ y \end{pmatrix} = \begin{pmatrix} A_{11} & A_{12} & A_{13} \\ A_{21} & A_{22} & A_{23} \\ A_{31} & A_{32} & A_{33} \end{pmatrix} \begin{pmatrix} R \\ G \\ B \end{pmatrix}$$

【0052】ここで、y、m、cはマスキングの結果得られる各色材y、m、cの電気信号量（それぞれ色信号\*  
K=MIN（y、m、c）

MIN：最小値を得る関数演算

その結果、y、m、cの各色材の消費量に相当する第2の色データは、それぞれの消費量から（1）式で求まる一※

$$Y = y - K$$

$$M = m - K$$

$$C = c - K$$

すなわち、ブラック（K）成分を用いることにより、色材の重なり量を少なくし、各色材の消費量が削減等の効果が期待できる。

【0059】このような色信号y、m、cから一定量のブラック成分を除去し、各信号量を減らすUCR処理を行うUCR回路の具体例を図3に示す。

【0060】図3において、色信号cと色信号mは比較器12aによりその値の大小が比較され、その結果の信

\* y、m、cと呼ぶ。）R、G、Bは色分解によるRGBの電気信号量、A1jはマスキング量を示す係数である。基本的には、この数1に基づいてマスキング回路が構成される。その一例が、図2に示したものである。RGBの第1の色データは、それぞれ乗算器10a、10b、10cに入力され、係数A11、A12、A13とそれぞれ乗算される。

【0053】次に乗算器10a、10bの各乗算結果がそれぞれ加算器11aに入力され、両者が加算される。

10 そして加算器11bでは乗算器10cの乗算結果と加算器11aの加算結果とが加算され、その加算結果が色信号cとして出力される。

【0054】同様に乗算器10d、10e、10fに入力されたRGBの第1の色データと、係数A21、A22、A23がそれぞれ乗算され、乗算器10d、10eの乗算結果が加算器11cで加算され、その加算結果と乗算器10fの乗算結果が加算器11dで加算されて、加算器11dから色信号mが出力される。

20 【0055】さらに、乗算器10g、10h、10iに入力されたRGBの第1の色データと、係数A31、A32、A33それぞれ乗算され、乗算器10g、10hの乗算結果が加算器11eで加算され、その加算結果と乗算器10iの乗算結果が加算器11fで加算されて、加算器11fから色信号yが出力される。

【0056】一方、カラー画像形成の際には色材の消費量を削減することが目的で、下地除去UCR（Under Color Removal）が使われる。その原理を簡単に説明すると、各色材y、m、cを同量混ぜたときに墨色、すなわち、ブラックが得られることに着目して、各色材y、m、cのそれぞれのうち最小量を求め、それを色材ブラックの消費量とする。すなわち、ブラックの消費量に相当する第2の色データKを定義すると、次式で表せる。

【0057】

$$\dots (1)$$

※定量のブラック成分を除去することにより、次式で表せる。

【0058】

$$\dots (2)$$

$$\dots (3)$$

$$\dots (4)$$

号（例えば色信号cが小さければ0）をセレクト13aに出力する。

【0061】セレクト13aの入力ポートP0とP1には、それぞれ色信号cと色信号mが入力され、比較器12aからの制御信号（例えばcが小さければ0）により入力ポート（例えばcが小さければ入力ポートP0）を選択して、その信号を出力する。この出力結果信号OUTPは、



$$\text{OUTP} = \text{MIN}(c, m)$$

となる。

【0062】同様に、比較器12bにこの信号OUTPと色信号yを入力し、その結果の制御信号をセクタ1\*

$$\text{OUTK} = \text{MIN}(y, m, c)$$

となり、ブラックの成分量のデジタル信号である第2の色データkが得られる。

【0063】さらに、色信号yと第2の色信号Kを減算器14aに入力し、信号量yから信号量kを差し引く減算により第2の色データYが得られる。同様に減算器14bで色信号mから第2の色データKを減算して第2の色データMが、減算器14cで色信号cから第2の色データKを減算して第2の色データCが各々得られる。

【0064】次に、消耗品算出部4について図4を参照して説明する。

【0065】第2の色データYがレジスタ16aの出力と共に、加算器15aに入力され、それらの値が加算されてレジスタ16aへ出力される。レジスタ16a、16b、16c、16dはカラー画像読取部1がカラー画像1画面を読み取り開始する際にゼロクリアされる。従って、レジスタ16aでは1画面分の画像の第2の色データYを積算し、カラー画像1画面の読み取り終了時にその積算色データΣYを出力する。

【0066】同様に、第2の色データがレジスタ16b※

$$\frac{8 \text{ (ビット)} \times 297 \text{ (mm)} \times 420 \text{ (mm)} \times \{400 \text{ (ドット)} / 25.4 \text{ (mm)}\}^2}{2} = 2.5 \times 10^8$$

であるから、レジスタ16a、16b、16c、16dのサイズは、各々28ビットで足りる。

【0070】次に、費用値算出部5について、図5を参照して説明する。

【0071】費用値算出部5には、消耗品算出部4からの積算色データΣY、ΣM、ΣC、ΣKの4つのデータ信号が入力される。

【0072】積算色データΣYとΣMは加算器20aに★

$$\Sigma Y + \Sigma M + \Sigma C \geq \Sigma K$$

の時、「0」を出力し、

$$\Sigma Y + \Sigma M + \Sigma C < \Sigma K$$

の時、「1」を出力するものである。

【0075】この場合、式(9)の条件を満たすときに、カラー画像読取部1で読み取られたカラー画像は、文字・表主体の印字率が最も小さい、例えばモノクロの原稿であることが判断できる。

【0076】一方、加算器20cでは、出力値(ΣY+ΣM+ΣC)と積算色データΣKの値が加算され、その☆

$$\Sigma Y + \Sigma M + \Sigma C + \Sigma K \geq T$$

の時、「0」を出力し、

$$\Sigma Y + \Sigma M + \Sigma C + \Sigma K < T$$

の時、「1」を出力するものである。

【0078】このとき、論理回路22では、信号CONT1を論理反転したものと比較器21aからの出力信号

$$\dots (5)$$

\*3bに入力し、また、信号OUTPと色信号yをそれぞれセクタ13bの入力ポートP2、P3に入力することで、その出力結果信号OUTKは、

$$\dots (6)$$

※の出力と共に、加算器15bに入力され、それらの値が加算されてレジスタ16bへ出力され、レジスタ16bでカラー画像1画面分の画像の第2の色データMを積算し、積算色データΣMを出力する。

【0067】また、第2の色データCがレジスタ16cの出力と共に、加算器15cに入力され、それらの値が加算されてレジスタ16cへ出力され、レジスタ16cでカラー画像1画面分の画像の第2の色データCを積算し、積算色データΣCを出力する。

【0068】さらに、第2の色データKがレジスタ16dの出力と共に、加算器15dに入力され、それらの値が加算されてレジスタ16dへ出力され、レジスタ16dでカラー画像1画面分の画像の第2の色データKを積算し、積算色データΣKを出力する。

【0069】このとき、カラー画像記録部3が、カラー画像をA3サイズ(297mm×420mm)に400dpiでハードコピーするとして、第2の色データの最大量は、1画素分の第2の色データが8ビットであるとき、

$$\frac{8 \text{ (ビット)} \times 297 \text{ (mm)} \times 420 \text{ (mm)} \times \{400 \text{ (ドット)} / 25.4 \text{ (mm)}\}^2}{2} = 2.5 \times 10^8$$

★入力されて、その値を加算した結果(ΣY+ΣM)は、加算器20bに出力される。

【0073】加算器20bでは、さらに積算色データΣCの値と加算され、その結果(ΣY+ΣM+ΣC)は加算器20cと比較器21bに出力される。

【0074】比較器21bでは、出力値(ΣY+ΣM+ΣC)とΣKの値とを比較して、その結果を信号CONT1として出力する。すなわち、信号CONT1は、

$$\dots (8)$$

$$\dots (9)$$

☆結果(ΣY+ΣM+ΣC+ΣK)が比較器21aに出力される。

【0077】比較器21aには、さらに、あらかじめ定められた閾値Tが入力され、出力値(ΣY+ΣM+ΣC+ΣK)とTの値とを比較して、その結果を論理回路22、23に出力する。すなわち、この比較器21aの出力信号は、

$$\dots (10)$$

$$\dots (11)$$

を論理反転したものと論理積を取り、その結果を信号CONT3として出力する。すなわち、信号CONT3は、



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$$\begin{aligned} \Sigma Y + \Sigma M + \Sigma C &\geq \Sigma K \text{ であり、かつ} \\ \Sigma Y + \Sigma M + \Sigma C + \Sigma K &< T \end{aligned} \quad \cdots (12)$$

の時、「0」を出力し、

$$\begin{aligned} \Sigma Y + \Sigma M + \Sigma C &\geq \Sigma K \text{ であり、かつ} \\ \Sigma Y + \Sigma M + \Sigma C + \Sigma K &\geq T \end{aligned} \quad \cdots (13)$$

の時、「1」を出力するものである。

【0079】この場合、式(13)の条件を満たすときに、カラー画像読取部1で読み取られたカラー画像は、自然画に代表されるような印字率50%以上の写真・印字物等の印字率50%以上のフルカラー原稿であること\*10

$$\begin{aligned} \Sigma Y + \Sigma M + \Sigma C &\geq \Sigma K \text{ であり、かつ} \\ \Sigma Y + \Sigma M + \Sigma C + \Sigma K &\geq T \end{aligned} \quad \cdots (14)$$

の時、「0」を出力し、

$$\begin{aligned} \Sigma Y + \Sigma M + \Sigma C &\geq \Sigma K \text{ であり、かつ} \\ \Sigma Y + \Sigma M + \Sigma C + \Sigma K &< T \end{aligned} \quad \cdots (15)$$

の時、「1」を出力するものである。

【0081】この場合、式(15)の条件を満たすときに、カラー画像読取部1で読み取られたカラー画像は、グラフ・図形を主体とした印字率が数十%程度の線面カラーの原稿であることが判断できる。

【0082】次に、表示部6について説明する。本実施例の画像形成装置には、その前面にユーザが作業指示を入力する為のコントロールパネルが設けられており、その一部に図6に示す表示部6が配置されている。

【0083】表示部6には、費用値算出部5からの、信号CONT1、CONT2、CONT3の3つの信号が入力される。それぞれの信号はLED点灯回路30a、30b、30cに入力され、それぞれの入力信号が「1」の時のみLED（発光ダイオード）31a、31b、31cを点灯させる。ここで、波線Nの右側は、コントロールパネル上の表示を示しているが、LED31a、31b、31cのそれぞれの横側には、各LEDの点灯が何を意味するかを示した文言を印刷したステッカー33a、33b、33cが貼り付けられ、更にこれらの上側にはステッカー32が貼られ、LED31a、31b、31cによりランニングコストが表示されることを明示するようになっている。

【0084】すなわち、表示部6では、信号CONT1、2、3により、カラー画像読取部1で読み取られたカラー画像は、モノクロ原稿、線画カラー原稿、フルカラー原稿のいずれかであることが表示される。このように印字率の高低により、ランニングコストを複数の段階（この場合、3段階）に区分できる。

【0085】なお、ここではLED表示の例を挙げたが、表示器は液晶パネルを用いたディスプレイでも良く、信号CONT1、2、3に応じて、ステッカー33a、33b、33cの文言を表示しても構わない。

【0086】次に、コピーカウンタ7について説明する。このコピーカウンタ7は通常、画像形成装置本体の内部に収納され、装置の保守担当者等が利用するもので

20

\*が判断できる。

【0080】論理回路23では、信号CONT1を論理反転したものと比較器21aからの出力信号との論理積をとり、その結果を信号CONT2として出力する。すなわち、信号CONT2は、

ある。

【0087】図7はコピーカウンタ7の構成を示している。費用値算出部5からの信号CONT1、2、3は、レジスタ40に入力される。

【0088】このレジスタ40は、図8に示すように3ビット構成で、信号CONT1、2、3がそれぞれ上位ビット、中位ビット、下位ビットに割り当てられている。信号CONT3が入力されると、例えば「4」が出力され、信号CONT2が入力されると、例えば「2」が出力され、信号CONT1が入力されると、例えば、「1」が出力される。

【0089】レジスタ40の出力は、不揮発性で電氣的に書換可能なEEPROM42から読み出された信号と共に加算器41に入力されて加算され、新たな積算値として再びEEPROM42に格納される。またその積算値は液晶表示器43に入力され、その値を表示する。

【0090】最後に、キーカウンタ8について説明する。その外観は、図9に示すように、ICカードの形態で本装置に対して着脱可能なものである。キーカウンタ8が画像形成装置本体に挿入されて装着されたとき、装置本体の費用値算出部5からの信号CONT1、2、3は、キーカウンタ8の表面に露出して設けられた端子部50を介してキーカウンタ8に入力されるようになっている。また、キーカウンタ8の表面には表示器51が設けられている。

【0091】図10は、キーカウンタ8の電氣的要部の構成を概略的に示したものである。

【0092】図10において、端子部50から入力された信号CONT1、2、3は、インタフェイス部52を介してCPU53に入力される。また、キーカウンタ8が画像形成装置本体に挿入されて装着されたとき、この端子部50は、電力供給用接点を兼ね、キーカウンタ8への電力供給がおこなえるようになっている。

【0093】インタフェイス部52は、画像形成装置本体とCPU53とのインタフェイスを司るものである。



【0094】CPU53は、EEPROM55にすでに記憶されている現在までの積算値を読み出し、その積算値に信号CONT1、2、3に応じた値を加算し、その結果としての積算値を再びEEPROM55に書き込むようになっている。このとき、PROM54に予め登録されたパターンの中から、その積算値に相当する数字パターンを読み出し、液晶パネルの表示器51に表示するようになっている。

【0095】PROM54には、コピーカウンタ8の動作プログラムが記憶されており、このプログラムに従ってCPU53がコピーカウンタ8全体の制御を司るようになっている。

【0096】尚、ここではキーカウンタ8は電源を持たない構造としたが、キーカウンタ8内に電池を設けても良く、更にコピーカウンタ7で説明したように、機械式的回転計数器で代用して積算値を表示するようにしてもよい。

【0097】図11は、この発明に係るフルカラー記録装置を示す図である。

【0098】この図において、像担持体としての感光体ドラム301が設けられ、反時計方向に回転する。

【0099】感光体ドラム301の周囲には、帯電器302、第1現像器309、第2現像器310、第3現像器311、第4現像器312、クリーニング前除電器313、感光体クリーナ314、および転写材支持体としての転写ドラム315が配置されている。

【0100】帯電器302と第1現像器309との間には、図5に示す如く、半導体レーザ（レーザダイオード）345、346からのレーザビームを走査するポリゴンミラー307、このポリゴンミラー307を駆動するポリゴンモータ308、ハーフミラー347、およびレンズ（図示していない）、ミラー304、305からなる露光部303がある。

【0101】現像器309～312は、それぞれ4色の異なるトナー（現像剤）により感光体ドラム301上の静電潜像を現像（可視化）するもので、たとえば第1現像器309はマゼンタ、第2現像器310はシアン、第3現像器311はイエロー、第4現像器312はブラックのトナーを具備している。

【0102】帯電器302によりその表面を一様に帯電された感光体ドラム301は、画像データによつて走査される前述の露光部303により露光され、静電潜像が形成される。この静電潜像は、前記画像データに対応した現像器309～312により現像された後、転写ドラム315に静電的に吸着された転写材としての用紙に、転写帯電器17の作用により順次転写される。感光体ドラム301上の未転写トナーは、クリーニング前除電器313で除電された後、感光体クリーナ314により清掃される。一方、用紙は、カセット323より給紙ローラ324で送り出され、レジストローラ325で一旦整

位される。そして、用紙は、転写ドラム315の吸着位置に対応した位置に設けられた吸着ローラ326および吸着帯電器316に向けてレジストローラ325で送られ、吸着帯電器316により転写ドラム315上に静電的に吸着される。

【0103】その後、前述のように、感光体ドラム301に対向する位置に設けられた転写帯電多色印字を行う場合は、前述の現像プロセス、転写プロセスが最大4回まで繰り返される。トナーの転写された用紙は、分離部327により、転写ドラム315から分離され搬送ベルト328、329、定着部330を順に介してトレイ331に排出される。

【0104】又、図12は、この発明に係るフルカラー記録装置を示す図である。

【0105】図12中、装置本体401は、その内部に、像担持体としての感光体ドラム402Y、402M、402C、402BKと平行状態になるようにイエロー（Y）、マゼンタ（M）、シアン（C）、ブラック（BK）の4色の像を記録する記録装置403Y、403M、403C、403BKが配置されている。各記録装置403Y、403M、403C、403BKは、それぞれ同じ構成となっているため、前段に配置されるイエローの記録装置3Yについてののみ説明し、他の記録装置403M、403C、403BKについては、同じ部分に同じ符号と色を示す添え字を付して説明を省略する。上記記録装置403Yは、感光体ドラム402Yと、これに対応して設けられて感光体ドラム402Y上にイエロー画像を繰り返し形成するための画像形成手段404Yを有する。画像形成手段404Yは、帯電装置405Y、露光装置406Y、現像装置407Y、クリーニング装置408Y、除電装置409Y等からなる。

【0106】また、上記各記録装置403Y、403M、403C、403BKの配設位置の下方は、転写材搬送手段としての転写搬送ベルト420が張設されており、前記感光体ドラム402Y、402M、402C、402BKに対して、用紙等の転写材410を搬送するようになっている。

【0107】更に、前記感光体ドラム402Y、402M、402C、402BKに対向する位置には、転写搬送ベルト420を挟んで転送手段としての転写装置421Y、421M、421C、421BKが配設されており、上記感光体ドラム402Y、402M、402C、402BKに形成された各色のトナー像が、搬送ベルト420によつて搬送される転写材410上に転写されるようになっている。上記転写材410は、給紙系422により、タイミングを取って搬送ベルト420上に供給される。

【0108】上記給紙系422は、図12に示すように、給紙カセット419から転写材410を取り出すピックアップローラ423、このピックアップローラ42



3により取り出された転写材410を搬送する送りローラ対424およびこの送りローラ対424により搬送される転写材410の先端整位を行なうとともにタイミングを取って送り込むレジストローラ対425からなる。

【0109】上記レジストローラ対425および前記転写搬送ベルト420による転写材10の移送速度は、感光体ドラム402Y、402M、402C、402BKの周速と等速になるように設定されている。

【0110】また、上記転写搬送ベルト420による転写材搬送方向（図中左方向）には、定着装置426、排紙ローラ対427、および排紙トレイ428が順次配設され、上記装置本体401の内底部には、各記録装置403Y、403M、403C、403BK、給紙系422およびその他の装置の動作制御を行う制御部50が設けられている。

【0111】しかして、図示しない操作入力部からカラー画像形成が指定された場合、イエロー（Y）、マゼンタ（M）、シアン（C）、ブラック（BK）の各記録装置403Y、403M、403C、403BKが所定のタイミングで動作して各感光体ドラム402Y、402M、402C、402BK上に各色のトナー像が形成される。

【0112】すなわち、記録装置403Yを例にとると、感光体ドラム402Yが図中時計回り方向（矢印A方向）に回転するとともにその表面が帯電装置405Yにより一様に帯電される。ついで、この一様に帯電された感光体ドラム402Y上に、露光装置406Yによる露光動作が行われイエロー画像に対応する潜像が形成される。この潜像は現像装置7Yに対向することによりトナーが供給されて現像されて感光体ドラム402Y上にイエロートナー像が形成されることになる。

【0113】なお、他色の記録装置403M、403C、403BKにおいても、同様にしてトナー像が形成されることになる。一方、このトナー像の形成動作に同期して、給紙カセット419から転写材10が取り出され、レジストローラ対425により先端を整位した後、転写材10が転写搬送ベルト420上に送り込まれる。

【0114】転写搬送ベルト上に送り込まれた転写材410は、吸着手段としての吸着ローラ429により転写搬送ベルト420に静電的に吸着された状態で転写搬送ベルト420の走行に沿って搬送され、まず、イエロートナー像転写位置、すなわち、すなわち、感光体ドラム402Yと転写装置421Yとが転写搬送ベルト420を挟んで対抗する位置に送り込まれる。

【0115】このイエロートナー像転写位置において転写材410は、感光体ドラム402Y上のイエロートナー像と接した状態になるとともに、転写装置421Yの働きによって、転写装置421Y上のイエロートナー像が転写材10上に転写される。

【0116】上記転写装置421Yは、半導電性を有す

る転写ローラによって構成され、搬送ベルト20の裏側から感光体ドラム2Yに静電的に付着しているイエロートナー像の電位と逆極性を有する電界を供給する。この電界は、搬送ベルト402および転写材410を通して感光体ドラム402Y上のイエロートナー像に作用し、その結果感光体ドラム2Yから転写材10にイエロートナー像が転写されるものである。

【0117】上記転写装置421Yは、半導電性を有する転写ローラによって構成され、搬送ベルト20の裏側から感光体ドラム2Yに静電的に付着しているイエロートナー像の電位と逆極性を有する電界を供給する。この電界は、搬送ベルト402および転写材410を通して感光体ドラム402Y上のイエロートナー像に作用し、その結果感光体ドラム2Yから転写材10にイエロートナー像が転写されるものである。

【0118】このようにしてイエロートナー像が転写された転写材10は、次いでマゼンタ記録装置403M、シアン記録装置403C、ブラック記録装置403BKのそれぞれの記録装置のトナー像転写位置に順次搬送されマゼンタトナー像、シアントナー像、ブラックトナー像が順次転写されカラー画像が形成される。

【0119】カラートナー像が形成された転写材410は次いで転写搬送ベルト420から剥離されて定着装置426へと送り込まれ、色重ねたカラートナー像の永久定着が行われた後、排紙ローラ対427を介して排紙トレイ428に搬出される。

【0120】一方、転写材が剥離された転写搬送ベルト420は、そのまま回転駆動されベルトクリーニング装置431により残留トナーや紙粉がクリーニングされ、次いで除電ローラ430により表面の電位が一定にされる。

【0121】また、トナー像が転写された後の感光体ドラム402Y、402M、402C、402BKはそのまま回転駆動され、クリーニング装置408Y、408M、408C、408BKによって残留トナーや紙粉がクリーニングされ、次いで、除電装置409Y、409M、409C、409BKの除電ランプで表面の電位が一定にされる。そして、必要に応じて再び帯電装置405Y、405M、405C、405BKからの一連のプロセスに入ることになる。

【0122】以上、説明したような構成の画像形成装置について、第1の実施例であるその動作処理について図13に示すフローチャートを参照して説明する。

【0123】カラー画像読取部1に原稿がセットされると、まず、図4のレジスタ16a～16d、及び図8のレジスタ40がリセットされて、それらの保持する値がすべて「0」になる（S1）。

【0124】次に、カラー画像読取部1から、ある単位画素の第1の色データR、G、B各8ビットのディジタ



ル信号が色変換部2に入力される(S2)。

【0125】色変換部2では、図2に示すように、第2の色データR、G、B各8ビットのデータが色信号c、m、y各8ビットのデータに変換され、続いて図3に示すように第2の色データY、M、C、K各8ビットのデータに変換されて、カラー画像記録部3と消耗品算出部4に出力される(S3)。

【0126】カラー画像記録部3では、第2の色データY、M、C、K各8ビットのデータをもとに、用紙など一の記録媒体にカラー1画点分を形成する(S4)。

【0127】一方、消耗品算出部4に送られた第2の色データY、M、C、K各8ビットのデータは、図4に示すように、加算器15a、15b、15c、15dにおいて、それぞれ、レジスタ16a、16b、16c、16dが保持している値と加算され、再び16a、16b、16c、16dに格納される(S5)。

【0128】以上の動作はカラー画像読取部1から出力される単位画素すべてに対して実行され、例えばA3サイズの画像1画分が画像読み取り装置で読み取り終了するまで、ステップS2に戻り、次の単位画素の第1の色データR、G、b各8ビットデータに対して以下のステップS3～ステップS5の処理が実行される(S6)。

【0129】画像1画分がカラー画素読取部1で読み取り終了すると消耗品算出部4から積算色データΣY、ΣM、ΣC、ΣKが費用値算出部5へ出力される(S7)。

【0130】費用値算出部5では図5に示すように、積算色データΣY、ΣM、ΣCの値が加算器20a、20b、20cにより順次加算され、その結果として、 $(\Sigma Y + \Sigma M + \Sigma C)$ の値とΣKの値の大小を比較的21bで比較し、また $(\Sigma Y + \Sigma M + \Sigma C + \Sigma K)$ の値と閾値Tとを比較的21aで比較し、それらの結果を論理回路22、23で処理し、信号CONT1、2、3を出力する。原稿の種別毎に、信号CONT1、2、3の出力値を表すと、本実施例の場合、次の3段階に区別される。

【0131】A)モノクロ原稿または色彩が少ないモノクロに近い原稿の場合は、 $(\Sigma Y + \Sigma M + \Sigma C) < \Sigma K$ となり、CONT1=1、CONT2=0、CONT3=0である。

【0132】B)色彩は豊富だが記録面積の少ない文字や線図形主体のカラー原稿の場合は、 $(\Sigma Y + \Sigma M + \Sigma C) \geq \Sigma K$ かつ $(\Sigma Y + \Sigma M + \Sigma C) < T$ となり、CONT1=0、CONT2=1、CONT3=0である。

【0133】C)色彩も記録面積も多い自然画の様なフルカラー原稿の場合は、 $(\Sigma Y + \Sigma M + \Sigma C) \geq \Sigma K$ かつ $(\Sigma Y + \Sigma M + \Sigma C) \geq T$ となり、CONT1=0、CONT2=0、CONT3=1である。

【0134】信号CONT1、2、3は、費用値算出部5から、図示しないユーザ用のコントロールパネル上に

設置された表示部6、画像形成装置本体の内部に収納されたコピーカウンタ7、使用する際にユーザにより画像形成装置本体に装着されるキーカウンタ8の各々へ出力される(S8)。

【0135】さて、表示部6に、信号CONT1、2、3が入力されると、図6に示すようにLED点灯回路30a、30b、30cが駆動され、信号CONT1、2、3にそれぞれ対応したLED31a、31b、31cのいずれかひとつが点灯する。このLED群の横には「ランニングコスト表示」と書かれたラベル32、及び「フルカラー：4倍」のラベル33a、「線画カラー：2倍」のラベル33b、「モノクロ：標準」のラベル33cが貼られており、上記のC)の場合に「フルカラー：4倍」のラベル33aが付されたLED31aが、B)の場合に「線画カラー：2倍」のラベル33bが付されたLED31bが、A)の場合に「モノクロ：標準」のラベル33cが付されたLED31cが点灯し、画像読取部1に設置されている原稿がそれぞれの文言どうりの種別でそれに応じた費用設定がなされることをユーザに対して表示する(S9)。

【0136】コピーカウンタ7では、信号CONT1、2、3がレジスタ40に入力され、上記A)、B)、C)に対応する費用値4、2、1が出力される。この費用値は加算器41により、EEPROM42にすでに格納されたそれまでの費用値に上乗せされ、その結果、更新された値が再度格納される。また、このEEPROM42で格納された値は、保守担当者等がユーザに対して使用料金を請求する際に液晶表示器43により確認できるようにになっている(S10)。

【0137】一方、キーカウンタ8では、PROM82に記憶されたプログラムに従って、端子部50とインターフェイス部52を介して費用値算出部からの信号CONT1、2、3がCPU53に取り込まれ、その値がEEPROM55に既にかき込まれている値に加算された後、再びEEPROM55に格納される。またその格納された値が表示器51に表示される(S11)。

【0138】以上に述べた実施例はその主旨を逸脱しない範囲で変形応用することが可能である。例えば、カラー画像記録部3でハードコピー動作をする前にユーザに費用値を提示し、了解を得てから動作を開始させることも可能であり、その方が付加価値が高い。この場合について、以下の第2～第3の実施例で説明する。

【0139】まず、第2の実施例として、画像形成装置の動作処理について図14に示すフローチャートを参照して説明する。なお、図13と同一部分には同一符号を付し、異なる部分についてのみ説明する。すなわち、図13のステップS4が削除され、ステップS9とステップS10の処理の間に、図14のステップS20～ステップS21の処理が追加される。

【0140】図13の第1の実施例では、カラー画像記



録部3での記録(S4)は、積算色データ $\Sigma Y$ 、 $\Sigma M$ 、 $\Sigma C$ 、 $\Sigma K$ の値を画素毎に算出する際に実行されていたが、図14の第2の実施例では、積算色データ $\Sigma Y$ 、 $\Sigma M$ 、 $\Sigma C$ 、 $\Sigma K$ の演算が終了し(S6、S7)、費用値が算出され(S8)、コントロールパネル上の表示部6で費用値を示すLEDが点灯(S9)した後、ユーザによるコピー開始キーの押下を確認する動作が追加され、その確認後(S20)に記録される(S21)こととしている。

【0141】これにより、ハードコピー出力の動作に入る前にユーザに費用値を提示し、ユーザの了解を得た上で出力動作が開始されることとなる。

【0142】この時、カラー画像記録部3に、第2の色データY、M、C、Kを蓄積する手段(具体的には、例えば、ROM)を設ければ、ステップS3で第2の色データY、M、C、Kが出力された際に、カラー画像記録部3にて1画面分の第2の色データを蓄積することが可能となり、ステップS21では、その蓄積手段で蓄積された第2の色データをもとに、ハードコピーが実行できる。

【0143】また、そのような蓄積手段は色変換部2に設けることも可能であり、ステップS20でコピー開始キーの押下が確認されると、色変換部2の蓄積手段で蓄積された第2の色データがカラー画像記録部3に送信され、ステップS21で、カラー画像記録部3でハードコピーが実行できる。

【0144】さらに、色変換部2に第1の色データR、G、Bを蓄積する手段を設けることも可能である。この場合、ステップS2で第1の色データR、G、Bが色変換部2に出力されたときに、色変換部2では、1画面分の第1の色データを蓄積する。ステップS20でコピー開始キーの押下が確認されると、色変換部2の蓄積手段で蓄積された第1の色データが第2の色データに変換されて、カラー画像記録部3に送信され、ステップS21で、カラー画像記録部3でハードコピーが実行できる。

【0145】第1の色データの蓄積手段を色変換部2に設ける場合と、前述の第2の色データの蓄積手段を色変換部2あるいはカラー画像記録部3に設ける場合とを比較すると、第1の色データは第2の色データよりもデータ量が少ないことから、その蓄積手段の容量が少なくすむという利点がある。

【0146】前述したように、第1の色データあるいは第2の色データを蓄積する手段を設けることができない場合は、図15に示すフローチャートのような動作処理を実行すればよい。

【0147】次に、第3の実施例として、この場合の画像形成装置の動作処理について図15に示すフローチャートを参照して説明する。なお、図14と同一部分には同一符号を付し、異なる部分についてのみ説明する。すなわち、図14のステップS21がステップS30～S

テップS32の処理に代わっている。

【0148】ステップS20でコピー開始キーの押下が確認されると、カラー画像読取部1で再びそこにセットされた原稿を読取って第1の色データを出力し(S30)、色変換部2で第2の色データに変換して(S31)、その第2の色データをもとにカラー画像記録部3でハードコピーを実行することになる(S32)。

【0149】この場合、実質的に、ステップS1～ステップS9の費用値算出時の画像読み取り(S2)は画像出力(ハードコピー)を伴わないブリスキャンとなる。また、コピー開始キーの押下とほとんどリアルタイムで、カラー画像記録部3でハードコピーの実行が可能であるので、特に、応答時間等の問題はない。

【0150】以上の第1～第3の実施例の説明において、費用値は、上記A)、B)、C)に対し、1、2、4の固定比率として説明したが、費用値を自由に設定することも可能であり、ユーザに受け入れられ易い現実的な設定を選べるようにしてもよい。

【0151】例えば、カラー画像記録部3として、感光体、現像器等から成る作像手段を4組持つ4連プロセスの電子写真方式記録では、色材であるトナーの消費量のみ増えると考えられ、モノクロに対して線画カラーで2倍、フルカラーで10倍と設定し、基本複写コスト(用紙+感光体など)+色材消費量というコスト設定とする。具体的には、モノクロのみの電子写真方式の場合の用紙の基本費用値をa、感光体等の基本費用値をb、色材消費量の基本費用値をcとすると、

前記A)の場合

用紙a+感光体等4b+色材消費量c=a+4b+c

30 前記B)の場合

用紙a+感光体等4b+色材消費量2c=a+4b+2c

前記C)の場合

用紙a+感光体等4b+色材消費量10c=a+4b+10c

となる。

【0152】一方、例えば、カラー画像記録部3として、ひとつの感光体で4回転でカラー画像を得る電子写真方式記録では、モノクロでの感光体部分の消耗は少なく、従って、基本複写コスト(用紙)+モノクロ/カラー差コスト+色材消費量というコスト設定になる。具体的には、

前記A)の場合

用紙a+感光体等b+色材消費量c=a+b+c

前記B)の場合

用紙a+感光体等4b+色材消費量2c=a+4b+2c

前記C)の場合

50 用紙a+感光体等4b+色材消費量10c=a+4b+10c



となる。

【0153】このような費用設定方法を設定する場合には、コントロールパネル上の表示器6やコピーカウンタ7の電氣的要部の構成を、例えば、図10に示すようなキーカウンタ8と同一の構成として、上記の費用値設定計算式とa、b、cの値をPROM54に予め書き込んでおき、CPU53により演算すれば良い。

【0154】さらに、以上の第1～第3の実施例の説明において、消耗品算出部4で加算器15a～15dに入力された全画素にわたる第2の色データの値を積算して積算色データを算出している。この場合に限らず、加算器15a～15dに入力された第2のデータを全画素とせず、n画素毎の入力として1/nに間引いてからレジスタ16a～16dの出力をn倍することで統計的には支障のない積算色データ $\Sigma Y$ 、 $\Sigma M$ 、 $\Sigma C$ 、 $\Sigma K$ を得ることができる。この方法は、処理速度を緩和させてCPUによるソフト処理で済ませることを狙うものである。なお、nの値としては8、16等が考えられる。

【0155】次に、第4の実施例について説明する。図16は、第4に実施例にかかる画像形成装置の構成を概略的に示したもので、図1と同一部分には同一符号を付し、異なる部分についてのみ説明する。すなわち、図1のカラー画像読取部1がカラー画像入力インタフェース部40に代わっている。

【0156】図16において、カラー画像入力インターフェイス部45は、図17に示すネットワークコントローラ41と画像メモリ42から成り、カラーFAX或いはLANなどのネットワークから伝送されてくるカラー画像データをネットワークコントローラで受信し、ここで、所定の変換処理等を行った後、画像メモリ42に蓄積するようになっている。

【0157】このカラー画像データは、光の3原色RGB、均等色空間の $L^*a^*b^*$ 、色度表示のXYZなどのいずれでも良い。特に、単一濃度のドットで画素を部分的に覆って濃度表示を行うための2値の誤差拡散データなどであると、画像メモリ42が最小限の構成になるので好ましい。

【0158】色変換部2は、カラー画像入力インタフェース部40からの3組のカラー画像データから色信号c、m、yを介して第2の色データY、M、C、Kに色変換するものである。すなわち、数1の右辺のRGBを3組のカラー画像データに置き換えてマトリクス係数A11～A33を選定すれば良い。なお、その他の構成は第1の実施例と同一である。

【0159】以上、説明したように、上記第1～第4の実施例によれば、カラー画像読取部1でセットされたカラー原稿を読取って第1の色データR、G、Bを出力し、色変換部2で実際の記録材の色成分に対応する第2の色データY、M、C、Kに変換して、その第2の色データをもとに消耗品算出部4で、カラー画像1画面分の

各記録材の消費量を算出して積算色データとして出力し、その積算色データによる記録材の消費量をもとに費用値算出部5で、モノクロに近い原稿、線画カラー原稿、フルカラー原稿のいずれかに分類し、その分類に応じた費用値比率（第1の実施例の場合、印字率に応じて1:2:4）に従って費用値を算出して、表示部6に表示したり、費用値請求用証拠手段でもあるコピーカウンタ7、キーカウンタ8で積算して、その積算値を記憶し表示することにより、カラー画像読取部1にセットされたカラー原稿について、その第2の色データをもとにして算出された各記録材の消費量（印字率）に応じて費用値設定でき、従って、印字率に応じてランニングコストを変えることが可能となる。

【0160】以下、本発明の第5の実施例について図面を参照して説明する。

【0161】図18は、第5の実施例に係る本発明の全体構成を示すものである。カラー画像読み取り部1はカラースキャナやカラーカメラ等であり、原稿となるカラー画像を縦横に分割した単位画素毎に、物体光をR（レッド）、G（グリーン）、B（ブルー）の光の3原色に応じた電気信号に変換し、各画素毎に各々8ビットのデジタルデータ、第1の色データとして出力する。色変換部2は画素毎に入力されるRGB各8ビットの第1の色データを、インキの3原色であるY（イエロー）、M（マゼンタ）、C（シアン）および、K（ブラック）の色材の量に相当する、第2の色データYMCK各8ビットのデータに変換して出力する。カラー画像記録部3は第2の色データYMCK各8ビットのデータに応じた量のYMCKの色材を用紙に付着させてハードコピー出力する。一方、第2の色データYMCK各8ビットのデータは消耗品算出部4へ導かれ、カラー画像1画面分の消耗品の量が算出される。費用値算出部5はYMCKの1画面分の消耗品の量を元に、予め設定されたルールにより複数段階の費用値を出力する。表示部6は本装置のユーザ用コントロールパネル上に設置された液晶パネルあるいはLEDアレイであり、費用値を表示する。コピーカウンタ7はコントロールパネル上あるいは装置内部に設置された機械式回転計数器あるいは不揮発性メモリと液晶等の表示器を組合せた物であり、カラー画像記録部3で1枚のハードコピー出力をする毎にその費用値に応じて計数値を繰り上げて行く。キーカウンタ8は装置に対して着脱可能な計数器であり、コピーカウンタ7と同様の機械式回転計数器あるいは不揮発性メモリと液晶等の表示器を組合せた物であり、装置に装着されている際にカラー画像記録部3からハードコピー出力がなされると、その費用値に応じて計数値が繰り上がる。

【0162】また、消耗品算出部4からの1画面分の消耗品の量と、費用値算出部5からの費用値は、統計処理部9にて保存されると共に、統計データに加工される。通信ユニット61では、公衆回線網を制御して統計処理



部9に蓄えられたデータを送信する。外部装置62は、通信ユニットからのデータを受信して管理するものである。

【0163】又、通信ユニット61は、費用値算出部5とも直接に接続され、外部装置62から公衆回線63を通じて、例えば費用値算出のための演算式のパラメータを変更する。こうすることで、ディーラ毎、販売店毎、あるいはユーザ毎に費用値の設定方法を外部装置から変

$$\begin{aligned} |c| &= |A11 \ A12 \ A13| \times |R| \\ |m| &= |A21 \ A22 \ A23| \times |G| \\ |y| &= |A31 \ A32 \ A33| \times |B| \end{aligned} \quad (16)$$

が使われる。図2はこの(16)式に相当する回路構成を示したものである。RGBデータはそれぞれ乗算器10a、10b、10cに入力され、係数A11、A12、A13とそれぞれ乗算される。次に乗算器10a、10bの各乗算結果がそれぞれ加算器11aに入力され、両者が加算される。そして加算器214では乗算器10cの乗算結果と加算器11aの加算結果とが加算され、その加算結果がcデータとして出力される。同様に乗算器11※

$$K = \text{MIN}(y, m, c)$$

MIN: 最小値を得る関数演算

により使用量が求められるK(ブラック)色材を使うこ★

$$Y = y - K$$

$$M = m - K$$

$$C = c - K$$

のように削減できる。図3は上式(17)および(18)に相当する回路の構成を示したものである。cデータとmデータは比較器12aによりその値の大小が比較され、その結果の信号(例えばcが小さければ0)をセレクト13aに出力する。セレクト13aは入力ポート☆30

$$P = \text{MIN}(c, m)$$

となる。同様に、比較器12bにこのPデータとyデータを入力し、その結果の制御信号およびPデータとyデータをセレクト232に入力することで上式(18)のKデータを得られる。

【0168】更に、yデータとKデータを減算器14aに入力し、yからKを差し引く減算によりYデータが得られる。同様にmデータとKデータから減算器14bによりMデータが、cデータとkデータから減算器14cによりCデータが各々得られる。

【0169】次に、消耗品算出部4について図4を用いて詳細に説明する。Yデータは加算器15aにレジスタ◆

$$8 \times 297 \times 420 \times (400 / 2.5) \cdot 4 \cdot 2 = 2.5 \times 10^{**8}$$

であるから、レジスタ16a、16b、16c、16dは各々28ビットで足りるが、加算器15a、15b、15c、15dへの入力データを全画素とせず、n画素毎の入力として1/nに間引いても、レジスタ16b、16c、16dの出力をn倍することで、統計的には支障の無いΣY、ΣM、ΣC、ΣKを得ることができる。

【0171】続いて、費用値算出部5について図19を

\*更可能とすることができる。

【0164】先ず、色変換部2について詳細に説明する。

【0165】一般に、カラー画像読み取り装置から得られる光の3原色RGBのデータをカラー記録装置の色材量を制御するインキの3原色のデータymcに変換する色修正処理の方法としては、マスキング方程式

※d、11e、10fに入力されたRGBデータにより加算器215からmデータが、乗算器10g、10h、10iに入力されたRGBデータにより加算器11fからyデータが出力される。

【0166】一方、カラー画像形成の際には色材の使用量を削減することが目的で、下地除去UCR(Under Color Removal)が使われる。

【0167】

$$(17)$$

★とで、そのKの色材量に相当する各色材量を

$$(18)$$

☆0と1にそれぞれcデータとmデータが入力され、比較器12aからの制御信号(例えばcが小さければ0)により入力ポートのデータ(例えばcが小さければ入力ポート0)を選択して出力する。この出力結果Pデータ

$$(19)$$

◆16aの出力と共に入力され、加算されてレジスタ16aへ出力される。レジスタ16aはカラー画像読み取り装置1がカラー画像1画面を読み取り開始する際にゼロクリアされ、1画面分の画像のYデータを積算し、カラー画像1画面の読み取り終了時にその値ΣYを出力する。同様に、Mデータ、Cデータ、Kデータもその積算結果ΣM、ΣC、ΣKが、それぞれレジスタ16b、16c、16dから出力される。

40 【0170】カラー画像記録部が、カラー画像をA3サイズに400dpiでハードコピーするとして、最大のデータ量は

用いて詳細に説明する。

【0172】費用値算出部には、消耗品算出部からのΣY、ΣM、ΣC、ΣKの4つの値が入力される。ΣYとΣMの値は加算器501に入力され、加算された出力値(ΣY+ΣM)は更にΣCの値と共に加算器502に入力されて加算され、(ΣY+ΣM+ΣC)の値が出力される。この出力値(ΣY+ΣM+ΣC)はΣKの値と共に



に比較器512に入力される。さらに、 $\Sigma K$ は、比較器513にしきい値T2とともに入力される。そこで、AND素子524の出力は、

信号CONT0:

$\Sigma Y + \Sigma M + \Sigma C < \Sigma K$  であり、  
 $\Sigma K \geq T2$  の時 出力0  
 $\Sigma K < T2$  の時 出力1

となる。これは、つまり、CONT0が意味するのは、印刷がほとんどモノクロであって、記録材の消費が少ない場合である。又、次に、AND素子523の出力信号CONT1は、

信号CONT1:

$\Sigma Y + \Sigma M + \Sigma C \geq \Sigma K$  の時 出力0  
 $\Sigma Y + \Sigma M + \Sigma C < \Sigma K$  であり、  
 $\Sigma K \geq T2$  の時 出力1

となる。

【0173】一方、 $(\Sigma Y + \Sigma M + \Sigma C)$ と $\Sigma K$ の値は加算器503に入力され、その加算値 $(\Sigma Y + \Sigma M + \Sigma C + \Sigma K)$ の値が出力され、比較器511に入力される。比較器511のもうひとつの入力値は、予め設定されたしきい値Tである。この比較器511の出力信号は、

$\Sigma Y + \Sigma M + \Sigma C + \Sigma K \geq T$  の時 出力0  
 $\Sigma Y + \Sigma M + \Sigma C + \Sigma K < T$  の時 出力1

この比較器511の出力信号は比較器512の出力信号(信号CONT1)と共に論理を反転されてAND素子521に入力される。従ってAND素子521の出力信号は、

信号CONT3:

$\Sigma Y + \Sigma M + \Sigma C \geq \Sigma K$  であり、かつ  
 $\Sigma Y + \Sigma M + \Sigma C + \Sigma K < T$  の時 出力0  
 $\Sigma Y + \Sigma M + \Sigma C + \Sigma K \geq T$  の時 出力1

更に、比較器512の出力信号の論理を反転させた信号と比較器511の出力信号はAND素子522に入力され、その出力信号は

信号CONT2:

$\Sigma Y + \Sigma M + \Sigma C \geq \Sigma K$  であり、かつ  
 $\Sigma Y + \Sigma M + \Sigma C + \Sigma K \geq T$  の時 出力0  
 $\Sigma Y + \Sigma M + \Sigma C + \Sigma K > T$  の時 出力1

ここで、表示部6について説明する。本発明の画像形成装置は前面にユーザが作業指示を入力する為のコントロールパネルが設けられており、その一部に図20に示す表示部6が配置されている。表示部6には、費用値算出部5から、CONT3、CONT2、CONT1、CONT0の4つの信号が入力される。それぞれの信号はLED点灯回路30a、30b、30c、30dに入力され、それぞれの入力信号が1の時のみLED31a、31b、31c、30dを点灯させる。波線Nの右側は、コントロールパネル上の表示を示しているが、LED31a、31b、31c、31dの横には図示の文言を印

刷したステッカー33a、33b、33c、33dが貼り付けられ、更にその上側にはステッカー32が貼られている。

【0174】なお、ここではLED表示の例を挙げたが、表示器は液晶パネルを用いたディスプレイでも良く、信号CONT3、CONT2、CONT1、CONT0に応じて、ステッカー33a、33b、33c、33dの文言を表示しても構わない。

【0175】次に、コピーカウンタ7について説明する。図21はコピーカウンタ7の構成を示している。費用値算出部5からの信号CONT3、CONT2、CONT1、CONT0は、レジスタ4.0に入れられる。このレジスタは図22に示すように4ビット構成で、信号CONT3、CONT2、CONT1、CONT0がそれぞれ上位ビット、中位ビット、下位ビット、最終ビットに割り当てられており、信号CONT3が入力されると出力が4に、CONT2だと2が、CONT1だと1が、CONT0だと0がそれぞれ出力される。この出力は不揮発性で電氣的に書換可能なEEPROM42から読み出された信号と共に加算器41に入力されて加算され、新たな積算値として再びEEPROM42に格納される。またその積算値は液晶表示器43に入力され、その値を表示する。

【0176】続いて、キーカウンタ8について説明する。キーカウンタ8はICカードの形態で本装置に対して着脱可能となっている。図9に構成を示す。費用値算出部5からの信号CONT3、CONT2、CONT1、CONT0は端子部50、インターフェイス部52を介してCPU53に入力される。またこの端子部50は画像形成装置10からキーカウンタ8への電力供給用接点も兼ねている。CPU53は、EEPROM42から読み出した旧積算値に、その信号CONT3、CONT2、CONT1、CONT0に応じた加算値を加え、新しい積算値を再びEEPROM55に書き込む。更にPROM54に予め登録されたパターンの中から、新しい積算値に相当する数字パターンを読み出し、液晶パネルの表示器51に表示する。キーカウンタ8の外観は、図10のように、パッケージ8の表面に端子部50および表示器51が露出している。

【0177】なお、ここでは電源を持たない構造としたが、キーカウンタ内に電池を設けても良く、更にコピーカウンタ7で説明したように、機械式の回転積算計で代用しても良い。

【0178】又、図33は、本発明の一実施例に係る画像形成装置のコントロールパネルの図、図34は、図33のコントロールパネルのブロックダイアグラムである。本発明の一つの変形例として、費用値の表示部として専用の表示部6(図1)を設けるのではなく、カラー画像記録部3に含まれるコントロールパネル101の液晶画面(LIQUID CRYSTAL DISPLAY)102の表示の一つ



として、費用値を表すことも可能である。このとき、コピーカウンタ7やキーカウンタ8も専用のものを設けるのではなく、液晶画面102に表示することもかのである。

【0179】コントロールパネル101は、一例として、パネル専用のCPU110、PROM111、ゲートアレイ109、I/Fバッファ108、RAM107、LCDコントローラドライバ106、LCD102、LEDドライバ105、LED104、キースイッチ103及びタッチパネル102を有している。

【0180】これらの構成により、オペレータがタッチパネル102、キースイッチ103を通じて与える指示をコントロールパネル専用のCPUが受けて、この指示情報をカラー画像記録部3に転送する。これにより、カラー画像の記録が行われる。

【0181】又、更に、費用値算出部5からの費用値結果及びコピーカウンタ値、キーカウンタ値も、専用CPU110を通じて、LCD102に表示される。

【0182】次に、図23に示す統計処理部9について説明する。統計処理9には、消耗品算出部4からΣY、ΣM、ΣC、ΣKの値が入力されると共に、費用値算出部から費用値の信号が入力される。各々の値はタイマ901の出力値と共に、EEPROMで構成される情報メモリ910に収納される。主制御部940は、主としてマイクロコンピュータとその周辺回路により構成され、不揮発性メモリによって構成されるプログラムメモリ920に記憶されているプログラムに従って動作する。統計データメモリ930は、書き換え可能なEEPROMによって構成され、情報メモリ910に格納されたデータを元に、主制御部940がプログラムメモリ950の統計処理プログラムによって処理した結果のデータを格納するメモリである。これらの情報メモリ910、プログラムメモリ920、統計データメモリ930、およびタイマ901は、それぞれデータバス950によって、主制御部940と接続されている。また、このデータバスは通信ユニット108とも接続されている。

【0183】図24に示す通信ユニット61について説明する。通信ユニット61の通信制御部1081は、情報蓄積/加工ユニットの主制御部940と接続され、データバス950を介してデータの送受信、および制御信号の送受信が行われる。また通信制御部1081は、通信ユニット61メモリ930、およびタイマ901は、それぞれデータバス950によって、主制御部940と接続されている。また、このデータバスは通信ユニット108とも接続されている。

【0184】図24に示す通信ユニット61について説明する。通信ユニット61の通信制御部1081は、情報蓄積/加工ユニットの主制御部940と接続され、データバス950を介してデータの送受信、および制御信号の送受信が行われる。また通信制御部1081は、通

信ユニット61の中のタイマ1082、パターンジェネレータ1083、および通信用インターフェイス1084などにも接続されている。通信用インターフェイス1084には、変復調器1085が接続されている。変復調器1085は、通信用インターフェイス1084から送られてくる各種データやその他の情報を転送に適したデータ形式の音声信号に変調し、更に送信フォーマットに従って網制御部1086を介して受け取ったデータを復調して、通信インターフェイス1084を介して通信制御部1081に送出するものである。ここで、網制御部1086は、回線を電話通話に使用する場合と、データ通信に使用する場合との切り換えや、着信信号の検出、自動ダイヤルなどを行うためのものである。タイマ82は、通信制御部1081が行う各種処理に必要な計時を行うほか、通信用の時計機能を有するもので、セットされた時間、たとえば、回線を電話通話に利用しない真夜中に、各種データや情報の通信を行う処理などに供されるものである。パターンジェネレータ1083は、通信制御部1081からコードデータを受取り、これに対応する画像データであるキャラクタパターンに変換して通信用インターフェイス1084に出力するものである。これにより、データの転送先が、例えばファクシミリ装置のように画像データを扱う機器である場合にも対応できるようになっている。

【0185】図25に示す外部装置62について説明する。外部装置62は、基本的には、網制御部1092、変復調器1093、および処理装置1094により構成されている。変復調器1093は、制御部1092を介して公衆回線63から受け取ったデータを、制御装置1094-1を介して、例えばCRTディスプレイなどの表示装置1094-2に表示したり、プリンタなどの印刷装置1094-3により印刷したり、あるいはフロッピーディスクなどの記憶装置1094-4に記憶させたりするものである。また、処理装置1094は、キーボードなどの入力装置1094-5を備えており、例えば外部装置62側から通信ユニット61に対して各種データの転送を要求できる。

【0186】さて、以上の構成から成る画像形成装置の動作を図26を用いて説明する。

【0187】カラー画像読み取り部1に原稿がセットされて図示しない複写開始スイッチが押下されると、図4のレジスタ16a、16b、16c、16d、及び図22のレジスタ40がリセットされてそれらの置値がすべて0になる(S51)。

【0188】次にカラー画像読み取り部1から、ある単位画素のRGB各8ビットのデジタルデータが色変換部2に入力される(S52)。色変換部2では、図2に示すように、このRGB各8ビットのデータが一端cm y各8ビットのデータに変換され、続いて図3に示すようにYMCK各8ビットのデータに変換されて、カラー



画像記録部 3 と消耗品算出部 4 に出力される (S 5 3)。

【0189】カラー画像記録部 3 に送られた YMCK 各 8 ビットのデータは用紙などの記録媒体にカラー 1 画点を形成するデータとなる (S 5 4)。一方、消耗品算出部 4 に送られた YMCK 各 8 ビットのデータは、図 4 に示すようにレジスタ 16 a, 16 b, 16 c, 16 d に蓄えられている値にそれぞれ加算器 15 a, 15 b, 15 c, 15 d により YMCK の新たな値が加えられ、レジスタ 16 a, 16 b, 16 c, 16 d に格納される (S 5 5)。

【0190】以上の動作はカラー画像読み取り部 1 から出力される単位画素すべてに対して実行され、例えば A 3 サイズの画像 1 画分が画像読み取り装置で読み取り終了するまで、ステップ 5 2 に戻って次の単位画素の RG \*

$$(\Sigma Y + \Sigma M + \Sigma C) \leq \Sigma K$$

$$\rightarrow \text{CONT0}=1, \text{CONT1}=0, \text{CONT2}=0, \text{CONT3}=0$$

B) モノクロ原稿または色彩が少ないモノクロに近い原稿 ※

$$(\Sigma Y + \Sigma M + \Sigma C) \leq \Sigma K$$

$$\rightarrow \text{CONT0}=0, \text{CONT1}=1, \text{CONT2}=0, \text{CONT3}=0$$

C) 色彩は豊富だが記録面積の少ない文字や線図形主体 ★

$$(\Sigma Y + \Sigma M + \Sigma C) > \Sigma K$$

$$\text{かつ } (\Sigma Y + \Sigma M + \Sigma C) \leq T$$

$$\rightarrow \text{CONT0}=0, \text{CONT1}=0, \text{CONT2}=1, \text{CONT3}=0$$

D) 色彩も記録面積も多い自然画のようなフルカラー原稿 ☆

$$(\Sigma Y + \Sigma M + \Sigma C) > \Sigma K$$

$$\text{かつ } (\Sigma Y + \Sigma M + \Sigma C) > T$$

$$\rightarrow \text{CONT0}=0, \text{CONT1}=0, \text{CONT2}=0, \text{CONT3}=1$$

である。この CONT0、CONT1、CONT2、CONT3 の信号は費用値算出部 5 から、図示しないユーザ用コントロールパネル上に設置された表示部 6、画像形成装置の内部に収納されたサービス・メンテナンス担当者用のコピーカウンタ 7、及び使用する際にユーザにより画像形成装置に差し込まれるキーカウンタ 8 の各々へ出力される (S 5 8)。

【0192】さて、表示部 6 に CONT0、CONT1、CONT2、CONT3 より信号が入力されると、図 20 に示すように LED 点灯回路 30 a, 30 b, 30 c, 30 d が駆動され、CONT0、CONT1、CONT2、CONT3 にそれぞれ対応した LED 31 a, 31 b, 31 c, 31 d のいずれかひとつが点灯する。この LED 群の横には「ランニングコスト表示」と書かれたラベル 32、及び「フルカラー：4 倍」のラベル 33 a、「線画カラー：2 倍」のラベル 33 b、「モノクロ：標準」のラベル 33 c、「モノクロ：小」のラベル 33 d が貼られており、上記の A) の場合に「フルカラー：4 倍」のラベル 33 a の横の LED 31 a が、B) の場合に「線画カラー：2 倍」のラベル 33 b の横の LED 31 b が、C) の場合に「モノクロ：標準」のラベル 33 c の横の LED 31 c が、D) の場合に「モ

\* B 各 8 ビットデータに対して処理が実行される (S 5 6)。

【0191】画像 1 画分が画像読み取り装置で読み取り終了すると消耗品算出部 4 から  $\Sigma Y$ 、 $\Sigma M$ 、 $\Sigma C$ 、 $\Sigma K$  の値が費用値算出部へ出力される (S 5 7)。費用値算出部では図 19 に示すように  $\Sigma Y$ 、 $\Sigma M$ 、 $\Sigma C$  の値が加算器 501、502 により順次加算され、その  $(\Sigma Y + \Sigma M + \Sigma C)$  の値と  $\Sigma K$  の値の大きさを比較器 512 で比べ、また  $(\Sigma Y + \Sigma M + \Sigma C)$  の値としきい値 T とを比較器 511 で比べ、その結果を論理素子 521、522 で処理し、出力端子 CONT0、CONT1、CONT2、CONT3 に対して信号を出力する。その組合せは、原稿の種別、及び入力信号に対応させると、A) モノクロ原稿または色彩が少ないモノクロに近い原稿であり、消費が少ないとき

$$\text{かつ } \Sigma K \leq T2$$

※稿であり、一定の消費があるとき

$$\text{かつ } \Sigma K > T2$$

★のカラー原稿

$$\leq T$$

☆稿

$$> T$$

モノクロ：小」のラベル 33 d の横の LED 31 d が点灯し、画像読み取り部に設置されている原稿がそれぞれの文言どうりの種別でそれに応じた費用設定がなされることをユーザに対して表示する (S 5 9)。コピーカウンタ 7 では、CONT0、CONT1、CONT2、CONT3 の信号がレジスタ 40 に入力され、上記 A)、B)、C)、D) に対応する費用値 4、2、1、0 が出力される。この費用値は加算器 711 により EEPROM 42 に格納済みの、それまでの費用値に上乗せされ、更新された値が再度格納される。また、この EEPROM 42 の値は、サービス・メンテナンス担当者がユーザに対して使用料金を請求する際に液晶表示器 43 により確認できる (S 60)。一方、キーカウンタ 8 では、PROM 54 に登録されたプログラムに従って、端子部 50 とインターフェイス部 52 を介して費用値算出部からの CONT0、CONT1、CONT2、CONT3 の信号が CPU 53 に取り込まれ、EEPROM 42 に既に書き込まれている値に加算された後、再び EEPROM 42 に格納される。またその格納された値が表示器 51 に表示される (S 61)。

【0193】一方、消耗品算出部 4 からの  $\Sigma Y$ 、 $\Sigma M$ 、 $\Sigma C$ 、 $\Sigma K$  の値、および費用値算出部 5 からの費用値



は、統計処理部9に入力され、そこで情報メモリ910にタイマ901の年/月/日/時/分/秒を表す出力値と共に格納される。

【0194】図32は、その格納形態を示した一例で、例えば、データ番号132には、 $\Sigma Y$ 、 $\Sigma M$ 、 $\Sigma C$ 、 $\Sigma K$ の値、100、60、40、30、および費用値4が、時間95/09/30/16/54/57とリンク\*

$$\begin{aligned} \text{累計} &= \sum_{i=A}^B (X) \\ i &= A \end{aligned}$$

ここで、iを情報メモリに格納されたデータ番号、Aをデータ番号の最小値1、Bをデータ番号の最大値すなわち最新時刻のデータ番号とすることで、情報メモリに格納された全データの累計値が求められる。この情報データは、例えばサービスマンがメンテナンス時にメモリアクセスすることで、メンテナンスサイクルに対応した情報データとなる。ここで、式(20)の(X)の部分 $\Sigma Y$ 、 $\Sigma M$ 、 $\Sigma C$ 、 $\Sigma K$ と置き換えることで消耗品トナーの消費量累積値、Y累計、M累計、C累計、K累計が求まり、また(20)式の(X)を情報メモリ910に格納されている費用値に置き換えることで費用値の累計が求められる。

【0197】別種の統計量として、一定時間毎の累積値を求めることもできる。例えば、情報メモリ910に格納された時間情報の第3区分目に着目する。その第3区分が同じ値を持つ連続データについて、データ番号iに相当する $\Sigma Y$ 、 $\Sigma M$ 、 $\Sigma C$ 、 $\Sigma K$ や費用値を累積すると同じ日に消費された消耗品トナーの累計値、あるいは費用値累計が求まる。例えば、図32において、時間情報の第3区分に30という数字を持つ連続データを捜すと、データ番号129から132までがそれに該当し、例えばその日の費用値の累計は、 $2+2+4+4=12$ となる。同様に時間の第4区分に着目すれば1時間毎の累計に、第2区分に着目すれば、月毎の累計となる。更※

$$\text{平均値} = \text{累計} / (B - A)$$

これらの統計処理は、タイマ901からの出力をトリガとして、一定時間毎、例えば1時間毎に主制御部940によって演算処理され、データを書き換える形で統計データメモリ930に格納される。

【0201】通信ユニット61は、内蔵のタイマ1082により一定時間毎、例えば1日に1回、通信料金が安い深夜などに起動し、統計データメモリ930に格納されたデータを通信用インターフェイス1084を介して受け取ると共に、変復調器1085により転送に適したデータ形式の音声信号に変調し、網制御部を介して公衆回線63に送出する。なお、網制御部で送信相手がファクシミリなどの画像データを扱う機器と判明した場合には、パターンジェネレータ1083によりキャラクターに変換して出力することもできる。

【0202】この音声信号は、外部装置62の網制御部

\*されて格納されている。

【0195】主制御部940は、プログラムメモリ920に格納された統計処理プログラムに従って、情報メモリ910のデータを統計処理して、統計データメモリ930に順次格納する。統計処理のひとつとして、各種情報の累計値が以下の式で求められる。

【0196】

… 式(20)

※に第3区分が同じ値でも、第4区分が12より大きい場合と小さい場合に分けて累積すれば、午前、午後に分けた累計が可能となる。

【0198】また、一定時間毎のコピー枚数を原稿の種類別に求めることもできる。データ番号129と130の時間情報を見ると、その差異は第6区分の秒に相当する部分だけであり、また消耗品トナーの量 $\Sigma Y$ 、 $\Sigma M$ 、 $\Sigma C$ 、 $\Sigma K$ 、および費用値も同じ値を示している。これは129と130が同一原稿による連続コピーであることを示しているが、このようにデータ番号はコピー1枚ずつに対応している。そこで、上述の時間情報第3区分に着目した1日毎の検索を費用値の値毎に、そのデータ件数を計数することでコピー枚数の計数が可能となる。

例えば、図32の時間情報の第3区分の30という数字を持つ連続データ129から132までに対し、費用値毎のデータ件数を計数すると、費用値1は無し、費用値2はデータ番号129と130の2件、費用値4はデータ番号131と132の2件という形で、95年9月30日のコピー枚数が原稿の種類別に相当する費用値別に計数される。

【0199】更に、別種の統計量として、平均値を求めることもできる。これは、上記の各種累計値をそのデータ数で除算することによって求められる。

【0200】

… 式(21)

1092を介して受信され、変復調器1093により元の統計データに変換されて、処理装置1094の、例えばフロッピーディスクなどの記憶装置1094-4に格納される。また、外部装置62からのデータ要求により、データ転送を起動することも可能である。この場合は、外部装置62の処理装置1094からの要求信号を、変復調器1093により音声信号に変調し、網制御部1092を介して公衆回線63へ送信する。通信ユニット61は公衆回線63からの音声信号を網制御部1086を介して変復調器1085により復調し、通信用インターフェイスを介して通信制御部を起動させる。その後のデータ転送は上述と同じである。

【0203】外部装置62の処理装置1094に格納された各種統計データは、処理装置1094のデータ処理プログラムにより、グラフ化されてディスプレイなどの



表示装置1094-2やプリンタなどの印刷装置1094-3に出力される。

【0204】第1の出力例として、図27に示す月毎の費用値別コピー枚数を折れ線グラフとして表した場合を説明する。この例では、費用値4のコピー枚数が増加傾向、すなわち自然画の様なフルカラー原稿のコピーが増加していることがわかる。フルカラーのコピーでは消耗品の使用量も多く、また機体内でのトナー飛散なども増えることから、サービスマンメンテナンスの頻度を増やした方が良く、ユーザからのクレームが来る前に対処することが可能となる。また図27の形式で、日毎、週毎の詳細なグラフを作成することもでき、その場合にはもっと緻密で素早い対処が可能となる。

【0205】また、図27に示した月別の、費用値毎のコピー枚数データは、ユーザへのコピーコスト請求のデータとして利用できる。ユーザへの請求金額は4種の月別費用値を足し合わせた値となるが、その請求の詳細として4種の原稿種別毎のコピー枚数を記入することで、納得の行く請求書を作成することができる。また、この月毎の請求金額が得られることで、サービスマンがユーザを訪問せずとも銀行口座の自動引き落とし等を利用して清算が可能である。特にコピー枚数が少なく、メンテナンスが不要な場合などに有効である。

【0206】第2の出力例として、図28のように曜日毎、費用値毎のコピー枚数を棒グラフ表示することもできる。このグラフは、サービスマンメンテナンスの作業日を判断することに活用できる。サービスマンメンテナンスの作業中は、ユーザの複写機使用を中断することになるので、ユーザの使用頻度が少ない日を選択する必要がある。図28の例では、土曜と日曜は全く使用されず、また火曜と木曜は使用頻度が低いことがわかる。また火曜と木曜を比べた場合、コピー枚数はほぼ同じであっても、木曜は費用値2と4、すなわちカラー原稿のコピーが多い。ひとつの感光体を用い、4回転でカラー画像を得る、いわゆる4回転方式電子写真記録のカラー複写機では、カラーコピーはモノクロコピーの約4倍の時間を要することから、その場合には、木曜は火曜に比べて複写機の稼働時間は長いことになる。従って、サービスマンメンテナンスの候補曜日として、全く使用しない土曜、日曜、機械の稼働時間の少ない火曜、コピー枚数の少ない木曜などが順次、候補として挙げられることとなる。

【0207】一方、ユーザのニーズに合わせたメンテナンスタイミングを考えることもできる。モノクロ原稿のコピーや文字/線画主体のカラー原稿のコピーでは、色調に関する要求はそれほど高くないが、自然画の様なフルカラー原稿のコピーの際には、色合いを気にすることが多い。図28の例では、費用値4に相当するフルカラー原稿のコピーは金曜に集中しており、これらの使用時に忠実な色再現を実現するには、木曜にサービスマンメンテナンスを実行するのが好ましいことがわかる。この実施

例では曜日毎の1週間表示としたが、同様に日毎や半日毎の1ヶ月表示として、月毎のメンテナンス・タイミングを決めることも同様に可能である。

【0208】第3の出力例として、図29のように日毎の消耗品累計を折れ線グラフで表示することができる。

これは、消耗品トナーの納入時期を決定することに役立つ。消耗品トナーは、カートリッジやボルトに収納されており、一般的にユーザやキーオペレーターが適時補給するが、カラー複写機では4色のトナーを使用するため4種類のカートリッジやボルトを複数本常備することになる。その1種類でも不足となるとコピー不可となり、サービスマンと呼ばざるを得ないが、かといって多くのカートリッジやボルトを常備するのはスペースの無駄となる。図29の例では、前回のサービスマン時に各2本のトナーボルトを予備として納入しており、12日の時点でK累計がトナー2本分に近い値となっていることから、K色トナーの納入が必要となっていることがわかる。また、このままでの割合で使われると、あと2〜3日で消費しきってしまうことが予測できる。更に、他の色の累計値データは、そのユーザ訪問時に他の色のボルトを納入すべきかの判断材料としても活用可能である。

【0209】第4の出力例として、図35に示すように、4色のトナーの消費量を各月別に棒グラフにて表示している。これは、訪問時にどれだけのトナーを供給するかを予測するのに役立つ。この例では、8月の消費量が4色のトナーのいずれも約半分に減っていることから、8月を迎える前のユーザの訪問時には、トナーのカートリッジやボルトの供給を半減するなどの控えめの供給コントロールが可能である。また、3月には年度末のためと推測されるモノクロ原稿複写によるK色トナーの消費が多く、前後月に対して約2倍も消費している。そこで、3月を迎える前のユーザ訪問時には、K色トナーのカートリッジやボルトの供給を倍にするなどの供給コントロールが可能である。同様に、9月はY色、M色、C色のトナーのカートリッジやボルトは約2倍、K色のトナーのカートリッジやボルトは約3倍を事前に供給して消耗品供給の過不足を防ぐことができる。従って、このようなグラフが得られることで、より効率的なサービスマンメンテナンスを行なうことができる。

【0210】なお、本実施例では公衆回線63を介して転送するデータを、統計処理部9の統計データメモリ930に格納された統計データとしたが、これを情報メモリ910に格納されたデータ番号、時間情報、ΣY、ΣM、ΣC、ΣK、費用値の全情報データとしても良く、その場合には情報蓄積/加工部にて演算した統計処理が、外部装置62の処理装置1094にて実現できる構成、すなわち主制御部940とプログラムメモリ920に相当するものが処理装置1094に備わっていれば良い。

【0211】また、以上に述べられた実施例はその主旨



を逸脱しない範囲で変形応用することが可能である。例えば、ハードコピー動作をする前にユーザに費用値を提示し、了解を得てから動作を開始させることも可能であり、付加価値が高い。これは以下の変形により実現される。

【0212】図26の第1の実施例ではカラー画像記録部3での記録(S54)は $\Sigma Y$ 、 $\Sigma M$ 、 $\Sigma C$ 、 $\Sigma K$ の値を画素毎に算出する際に実行されていたが、図30に示すように、 $\Sigma Y$ 、 $\Sigma M$ 、 $\Sigma C$ 、 $\Sigma K$ の演算が終了し(S56、S57)、費用値が算出され(S58)、コントロールパネル上の表示部6で費用値を示すLEDが点灯(S59)した後、ユーザによるコピー開始キーの押下を確認する動作が追加され、その確認後(S60)に記録される(S61)こととしている。これにより、ハードコピー出力の動作に入る前にユーザに費用値を提示し、ユーザの了解を得た上で出力動作が開始されることとなる。この時、画像記録部3に1画面分のカラー画像データを蓄積する手段を設ければS61は即時実行できるが、蓄積手段を持たない画像記録部3に対しては図31に示すように、カラー画像読み取り部1からもう一度カラー画像データを受けて(S102)、Y、M、C、Kデータに変換(S103)して記録(S104)することになり、実質的に費用値算出時の画像読み取りは画像出力を伴わないブリスキャンとなる。

【0213】別の変形例として、費用値を自由に設定することも可能であり、ユーザに受け入れられ易い現実的な設定を選ぶ。

【0214】費用設定に関して第1実施例等では、A)、B)、C)に対して1、2、4の固定比率として説明した。しかし、画像記録装置3として、感光体、現像器等から成る作業手段を4組持ついわゆる4連プロセス電子写真記録では、色材であるトナーの消費量のみ増えたと考えられる。

【0215】図36は、本発明の4回転式カラー画像形成装置を用いた場合の費用値を示す表である。更に、モノクロの小のもの(0)と標準(1)との2種類を考え、更にカラー線画(2)、フルカラー(3)を加え4種類の場合のトナー使用量を検討する。トナーの使用量をモノクロ小(0)をcとしてこれを1単位とした時、一例として、モノクロ(1)で2倍、線画カラー(2)で4倍、フルカラー(3)で20倍の場合が図36に示される。この結果、サービス人件費d、マージンe等を含めると、例えば、モノクロ(0)なら、費用値(0) =  $a + b + c + d + e$  が結果として求められる。この場合注目すべきは、いわゆる4回転方式電子写真記録では、その方式に基づき、モノクロでの感光体部分の消費(b)は少なく、カラーの消費(4b)とは異なる。このような費用値の設定は、コントロールパネル上の表示器6やコピーカウンタ7を、例えばキーカウンタ8と同一の構成として、上記の式をPROM54に予め書き込

んでおき、CPU53により演算すればよい。

【0216】上述の「感光体など」は、定期的に交換が必要な、感光体ドラム、現像剤、定着用の上下ヒートローラー、クリーニング用ブレード、チャードワイヤなどが含まれ、コストは各部品の価値をそのライフ(交換サイクル)で割った値を累計した、 $\Sigma$ (消耗品価値/消耗品ライフ)である。又、「サービス人件費」は、上記消耗品の交換を含む定期点検、故障修理およびオーバーホールに要するサービスマンの人件費を1枚当たりのコストに換算した値である。同様に「マージン」は、営業利益を1枚当たりのコストに換算した値である。

【0217】又、これらの値は、販売店毎に変えることが可能である。このため、このような値(パラメータ)は、コントロールパネル101のキーボード102、103等から必要に応じて、新たな数値を入力することで変更が可能となる。

【0218】又、更にこのパラメータは、上記した通信ユニット61を用いて公衆回線63を介して外部装置62等からの変更が可能となる。

【0219】又、図37は、本発明の4連式カラー画像形成装置を用いた場合の費用値を示す表である。4回転式の場合と同様に、モノクロ小(0)、モノクロ標準(1)、カラー線画(2)、フルカラー(3)の4種類の場合のトナー使用量を検討する。

【0220】この場合は、4回転式の場合のように、モノクロの感光体の少ない消費という場合が当てはまらないので、4種類とも同様の感光体の費用が設定される。

【0221】なお、これらの例では用紙のコストも費用値に含めたが、用紙を別売りとした場合には、その分aだけ費用値を低く設定すれば良い。

【0222】また、別の変形例として、消耗品算出部4の演算を間引いて実行する方法も考えられる。これは画像形成に必要なY、M、C、Kデータの単位画素毎の演算に対し、消耗品の量は概算値で良いことを利用して、処理速度を緩和させてCPUによるソフト処理で済ませることを狙うものである。図4において入力データY、M、C、Kは全面素で有る必要は無く、A3サイズの画像、400dpiの解像度で約4Mbyte/色のデータ量に対して、統計的には100程度のサンプリングで良いとすれば、4万画素毎の1画素を抜き取るような間引きが可能である。

【0223】また、本発明の実施においては、必ずしも費用値算出部5の構成が必要なものではない。つまり、費用値算出部5の構成を設けない場合でも、トナーの消耗品算出部4からの消耗量データを統計処理部9において統計処理し、この統計データを外部に転送することで、例えば、メンテナンス業務の効率化を実現するデータの供給が可能な画像形成装置を提供することができることは言うまでもない。

【0224】



【発明の効果】以上説明したように本発明によれば、メンテナンス業務等の効率化を可能とするデータベースを実現する画像形成装置を提供することができる。

【0225】更に、記録速度が高速でかつ印字率に応じてユーザに対する請求価格を適宜設定することが可能な画像形成装置を提供することができる。

#### 【図面の簡単な説明】

【図1】本発明の第1の実施例に係る画像形成装置の構成を概略的に示すブロック図。

【図2】色変換部の前段の電気的要部の構成を概略的に示すブロック図。

【図3】色変換部の後段の電気的要部の構成を概略的に示すブロック図。

【図4】消耗品算出部の電気的要部の構成を概略的に示すブロック図。

【図5】費用値算出部の電気的要部の構成を概略的に示すブロック図。

【図6】表示部の構成を概略的に示すブロック図。

【図7】コピーカウンタの電気的要部の構成を概略的に示すブロック図。

【図8】コピーカウンタのレジスタの構成を示す概念図。

【図9】キーカウンタの外観を示す斜視図。

【図10】キーカウンタの電気的要部の構成を概略的に示すブロック図。

【図11】第1の実施例に係る画像形成装置の動作処理を説明するためのフローチャート

【図12】第2の実施例に係る画像形成装置の動作処理を説明するためのフローチャート

【図13】第3の実施例に係る画像形成装置の動作処理を説明するためのフローチャート

【図14】第4の実施例に係る画像形成装置の構成を概略的に示すブロック図。

【図15】第4の実施例に係るカラー画像入力インターフェイス部の構成を概略的に示す図。

【図16】第4の実施例に係る画像形成装置の構成を概略的に示すブロック図。

【図17】第4の実施例に係るカラー画像入力インターフェイス部の構成を概略的に示す図。

【図18】本発明の第5の実施例に係る画像形成装置

の構成を概略的に示すブロック図。

【図19】費用値算出部の構成を概略的に示すブロック図。

【図20】第5の実施例に係る表示部の構成を概略的に示すブロック図。

【図21】第5の実施例に係るコピーカウンタの電気的要部の構成を概略的に示すブロック図。

【図22】第5の実施例に係るコピーカウンタのレジスタの構成を示す概念図。

【図23】統計処理部の構成を示すブロック図。

【図24】通信ユニットの構成を示すブロック図。

【図25】外部装置の構成を示すブロック図。

【図26】本発明の一実施例に係る画像形成装置の動作を説明するフローチャート。

【図27】外部装置の第1の出力例を示すグラフ。

【図28】外部装置の第2の出力例を示すグラフ。

【図29】外部装置の第3の出力例を示すグラフ。

【図30】本発明の一実施例の変形例の動作を説明するフローチャート。

【図31】変形例の補足動作を説明するフローチャート。

【図32】情報蓄積/加工部の情報メモリの情報格納形態を示す表。

【図33】本発明の一実施例に係る画像形成装置のコントロールパネルの図。

【図34】図33のコントロールパネルのブロックダイアグラム。

【図35】トナーの消費量を統計的に示したヒストグラム。

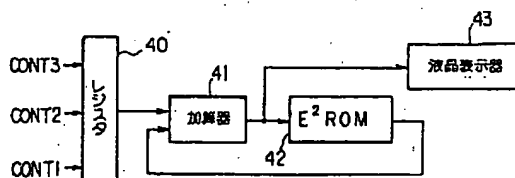
【図36】本発明の4回転式カラー画像形成装置を用いた場合の費用値を示す表。

【図37】本発明の4連式カラー画像形成装置を用いた場合の費用値を示す表。

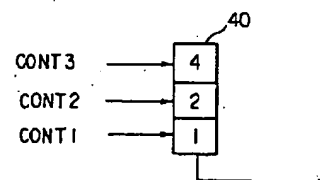
#### 【符号の説明】

1…カラー画像読取部、2…色変換部、3…カラー画像記録部、4…消耗品算出部、5…費用値算出部、6…表示部、7…コピーカウンタ、8…キーカウンタ、9…統計処理部、40…カラー画像入力インターフェイス部、61…通信ユニット、62…外部装置、63…公衆回線、101…コントロールパネル。

【図7】

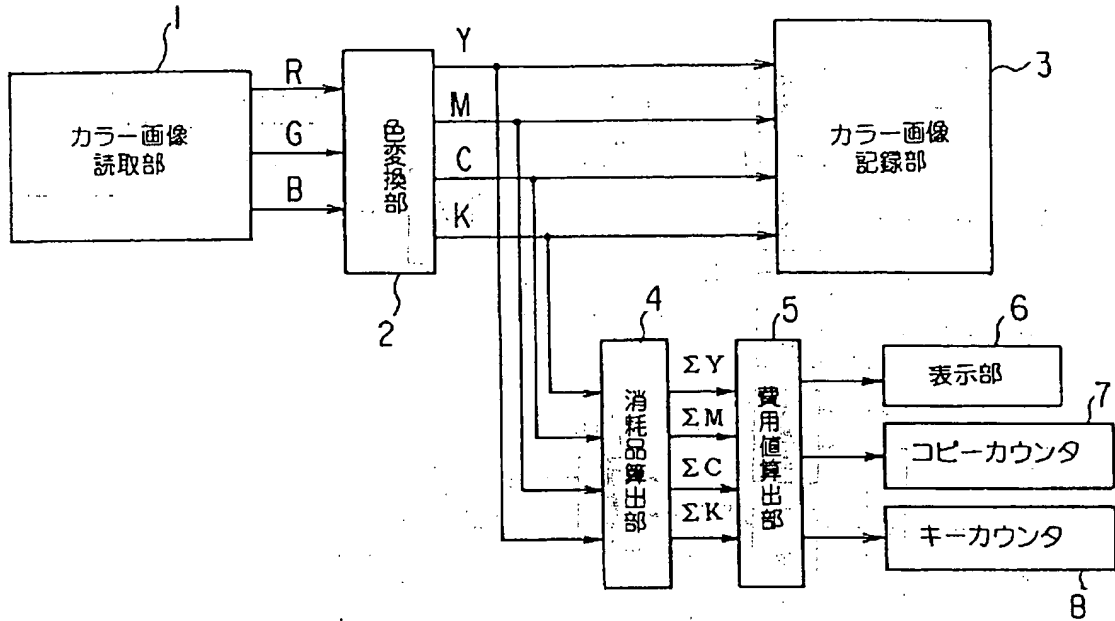


【図8】

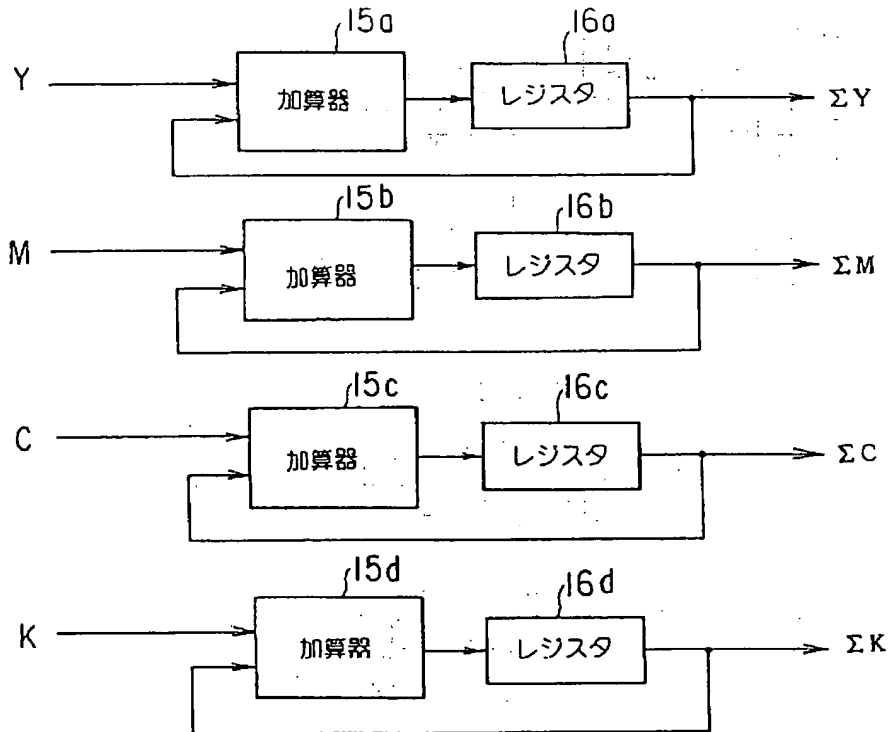




【図1】

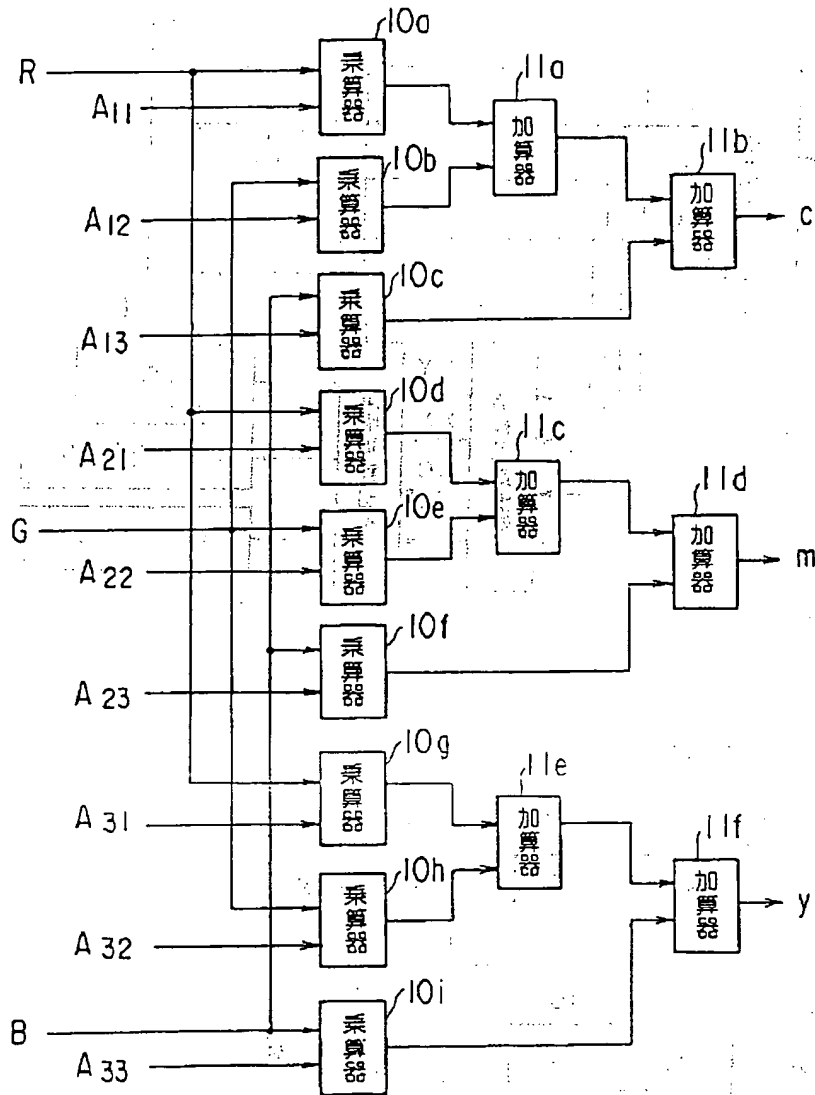


【図4】

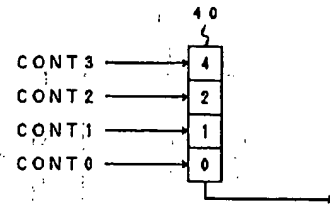




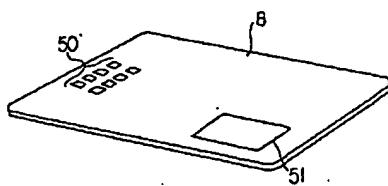
【図 2】



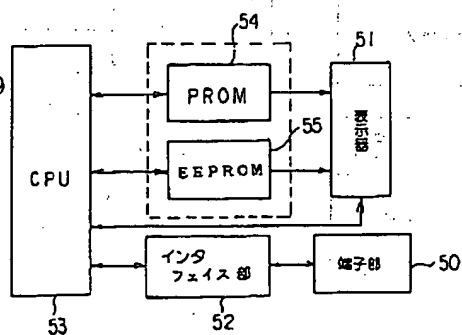
【図 2 2】



【図 9】

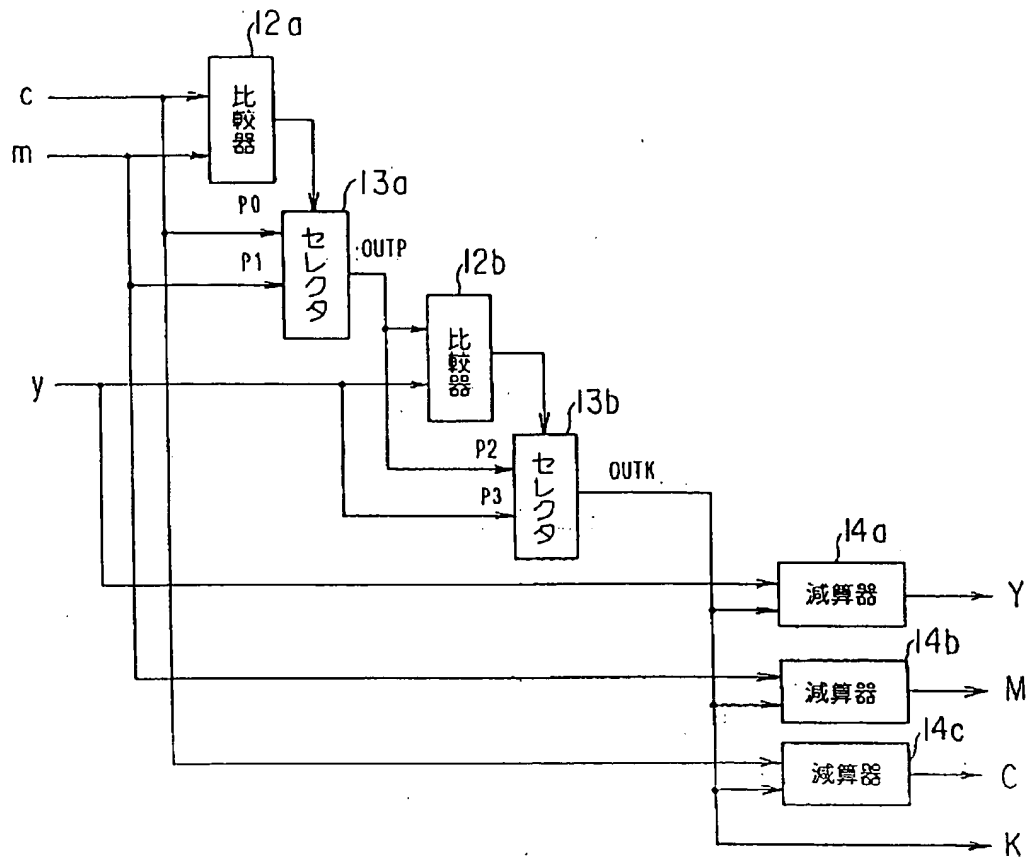


【図 10】

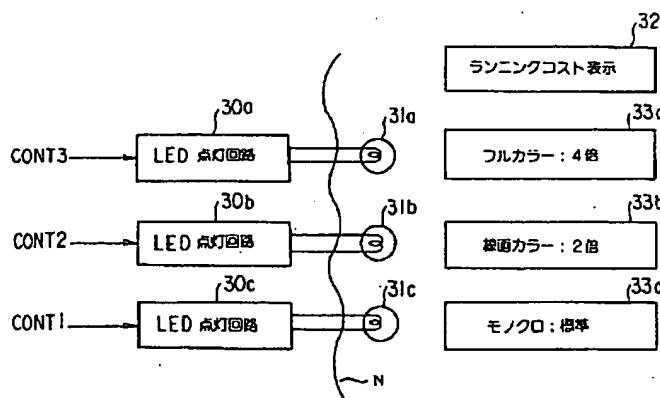




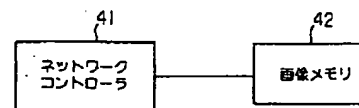
【図 3】



【図 6】

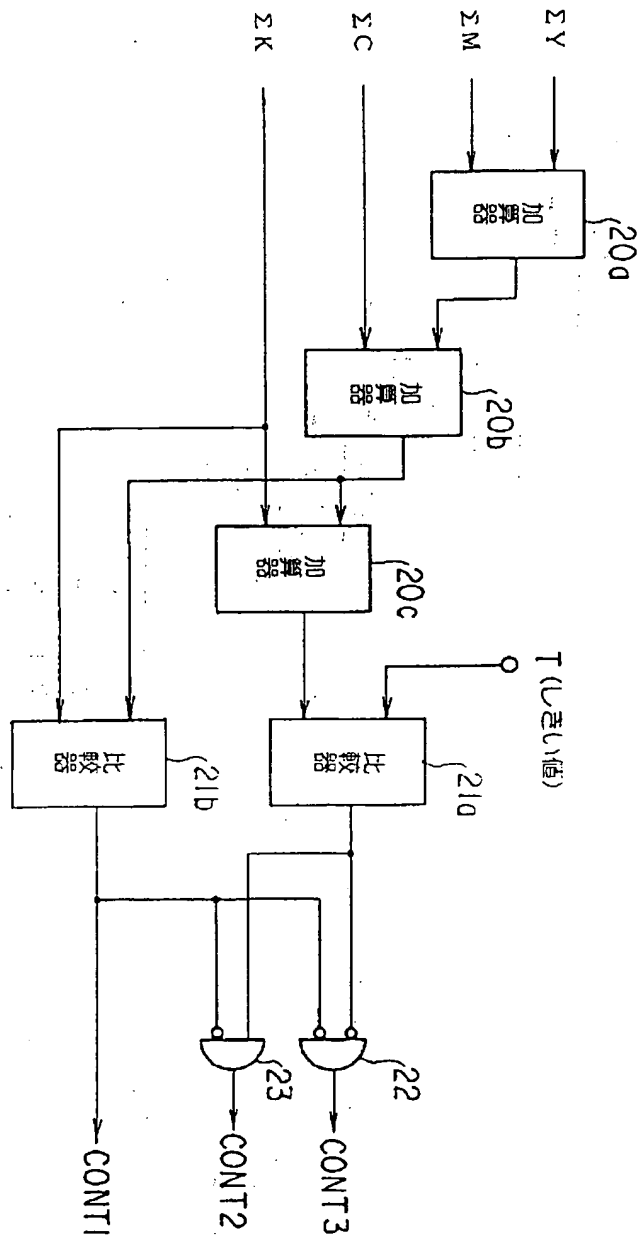


【図 17】



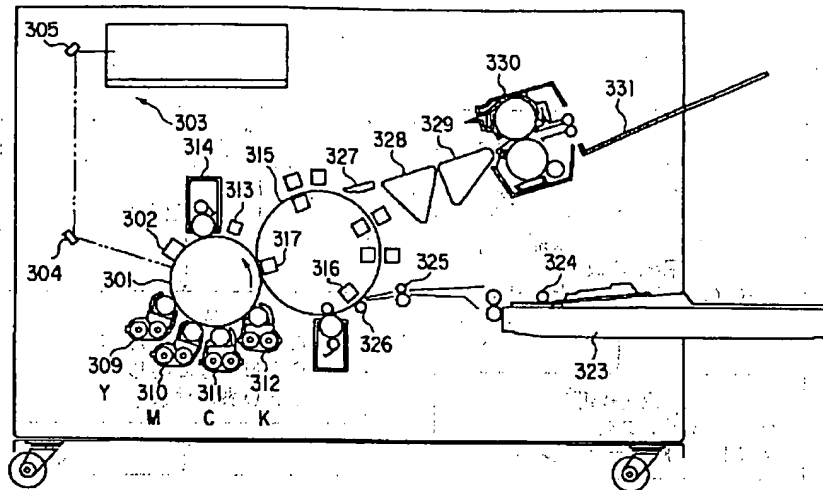


【図5】

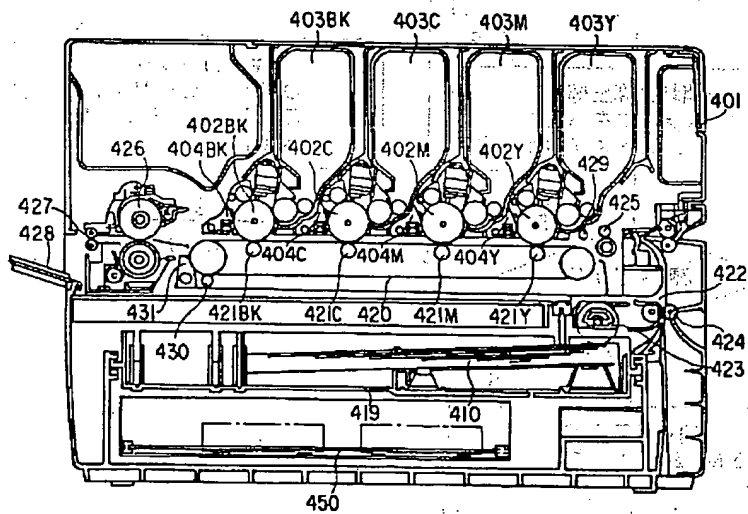




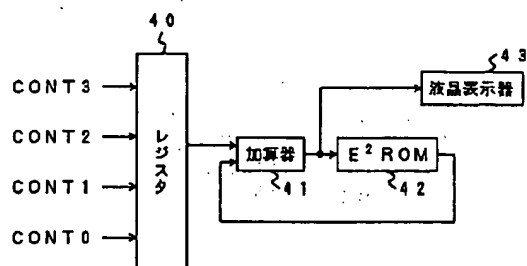
【図11】



【図12】

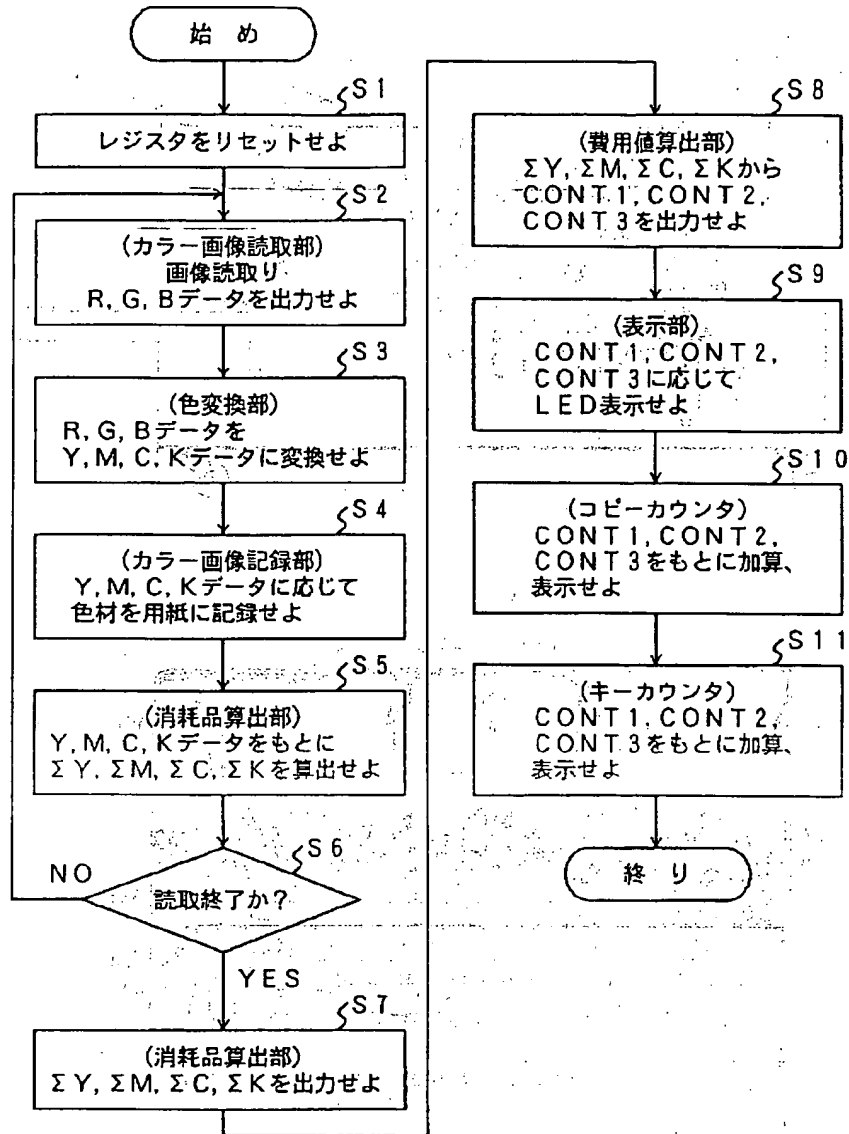


【図21】

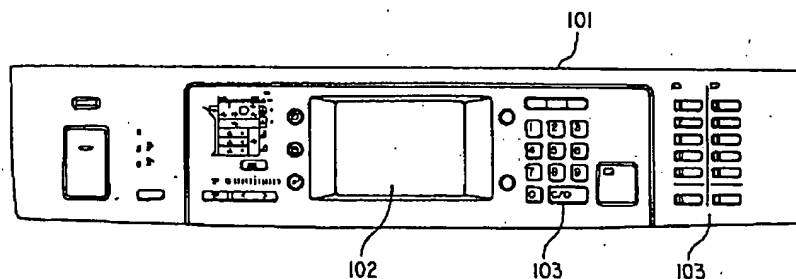




【図13】

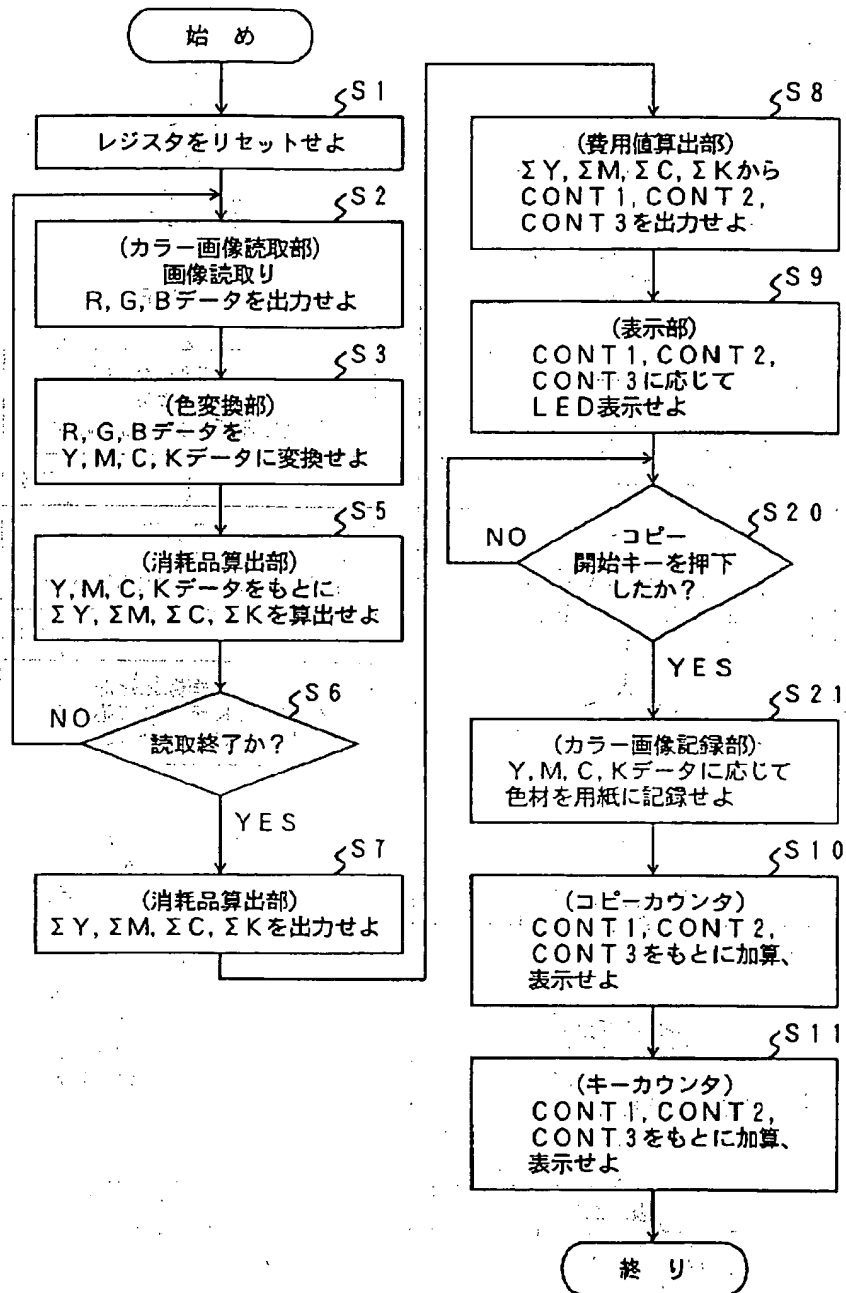


【図33】



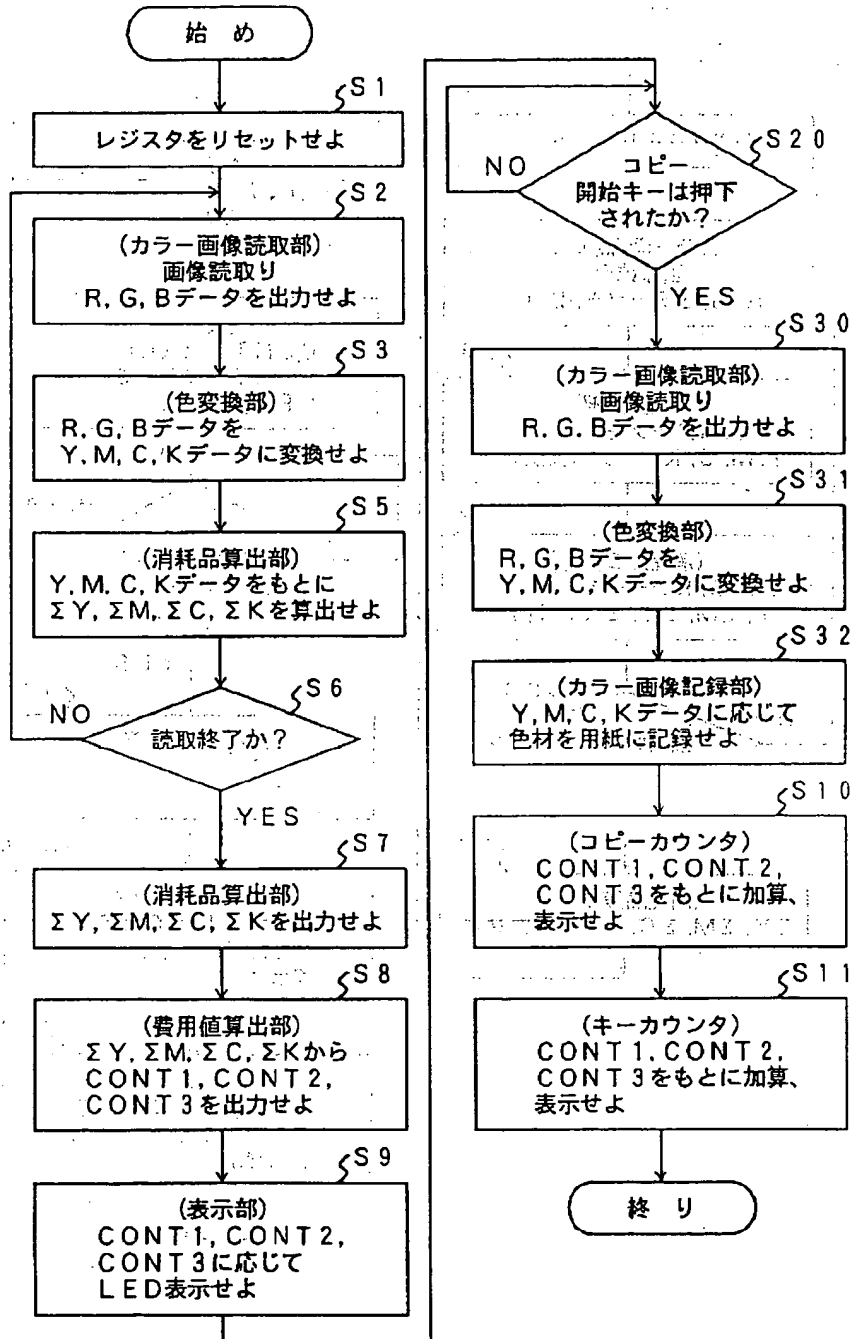


【図14】



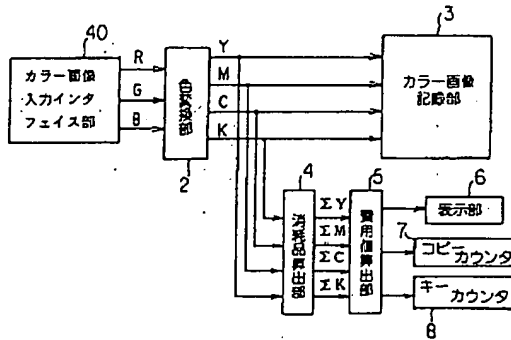


【図15】





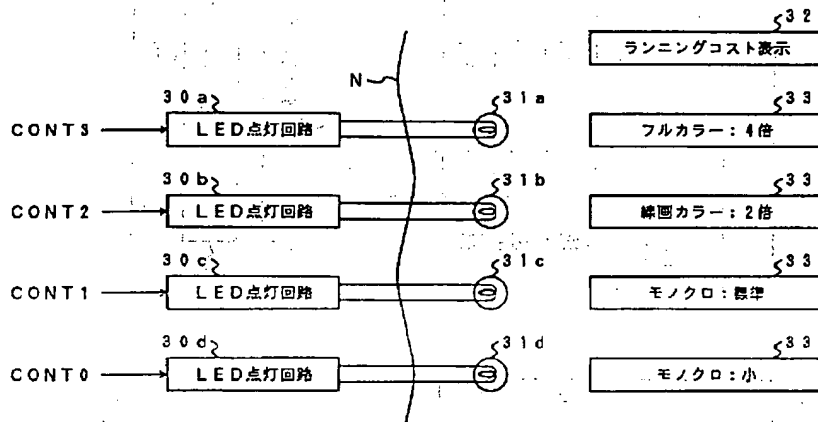
【図 16】



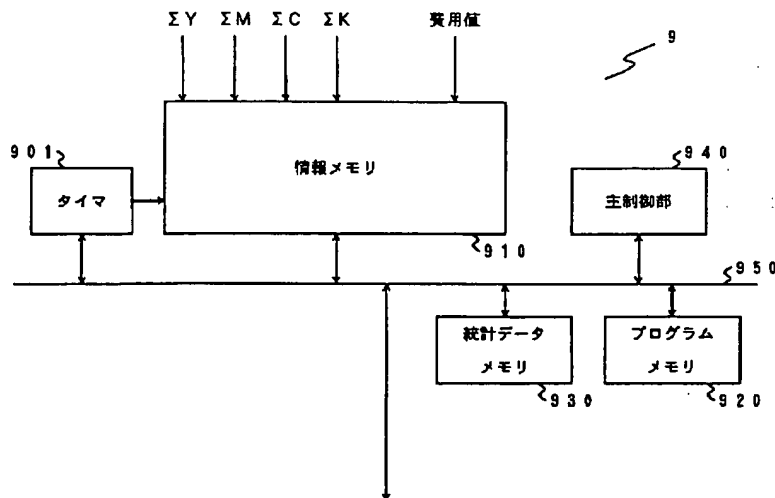
【図 36】

	モノクロ (0)	モノクロ (1)	カラー線画 (2)	フルカラー (3)
用紙	a	a	a	a
感光体等	b	b	4b	4b
トナー	c	2c	4c	20c
サービス人件費	d	d	d	d
マージン	e	e	e	e
費用値	$a+b+c+d+e$	$a+b+2c+d+e$	$a+4b+4c+d+e$	$a+4b+20c+d+e$

【図 20】

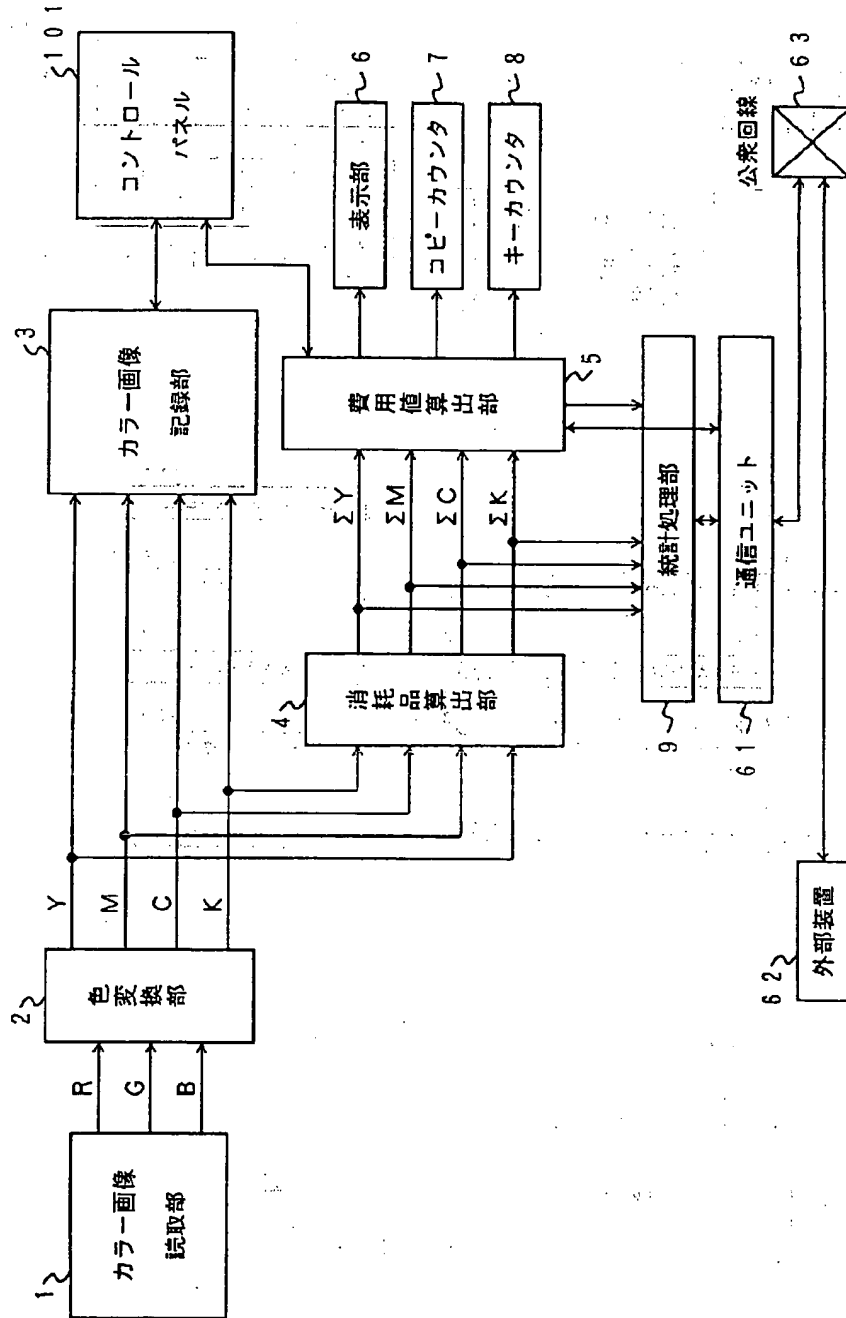


【図 23】



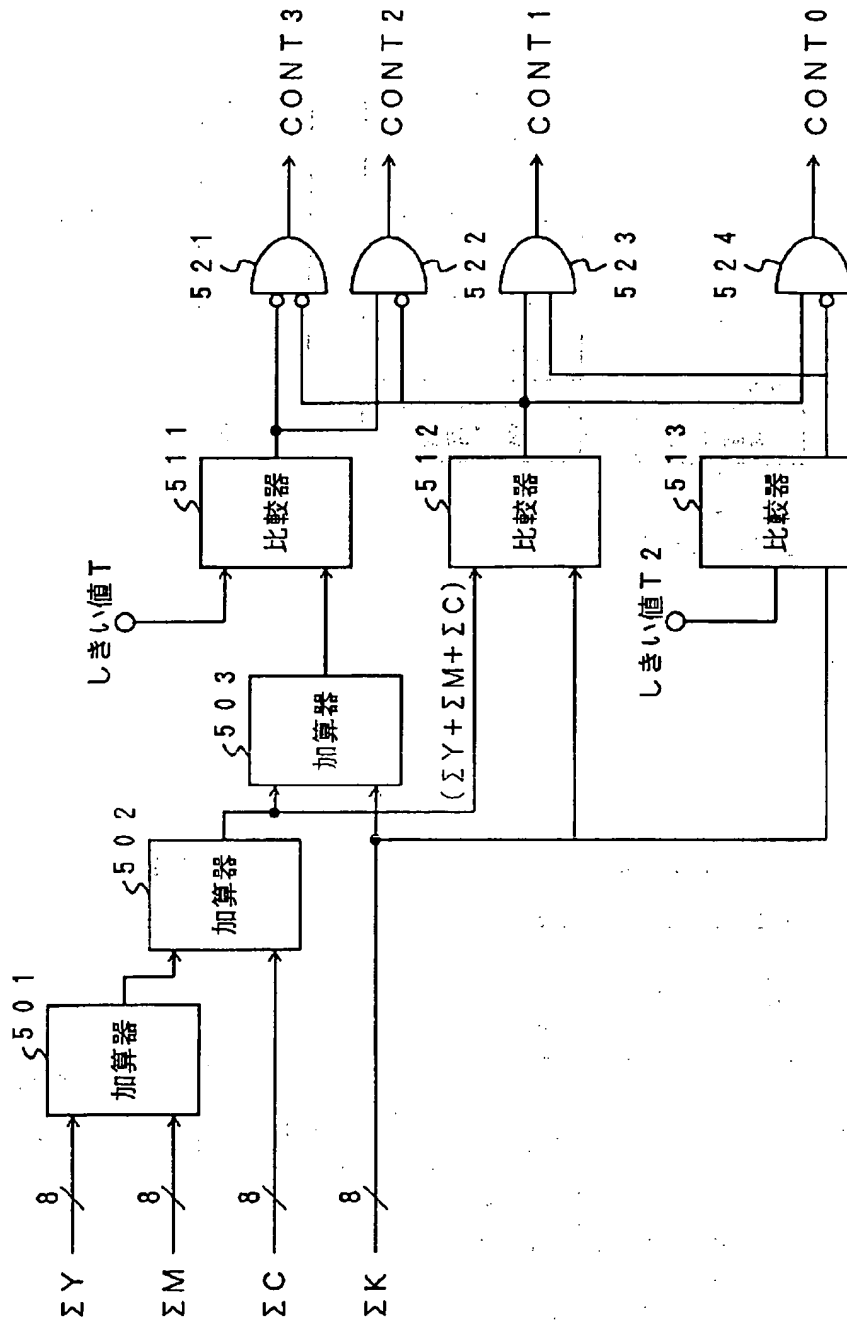


【図18】



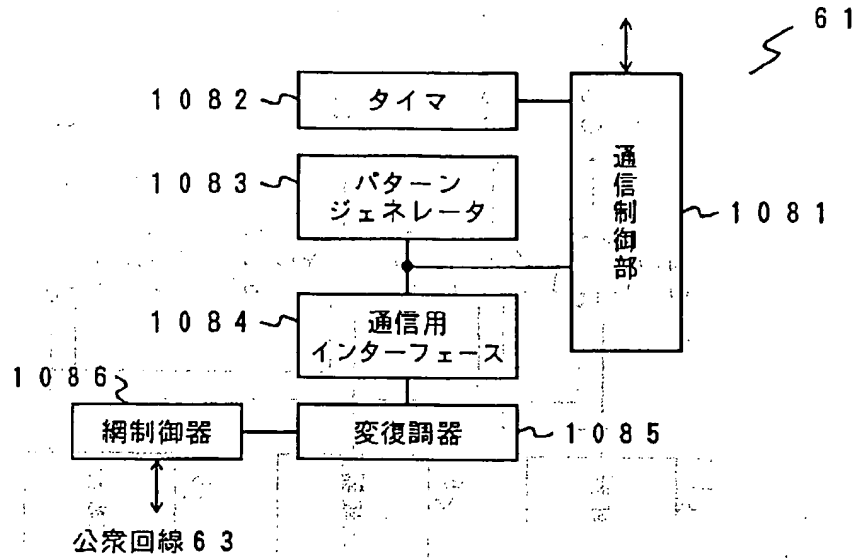


【図19】

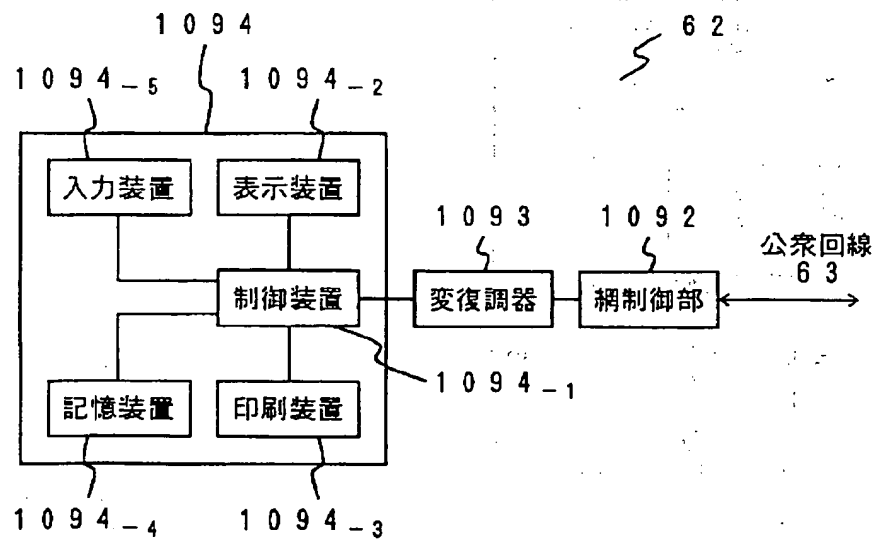




【図 24】

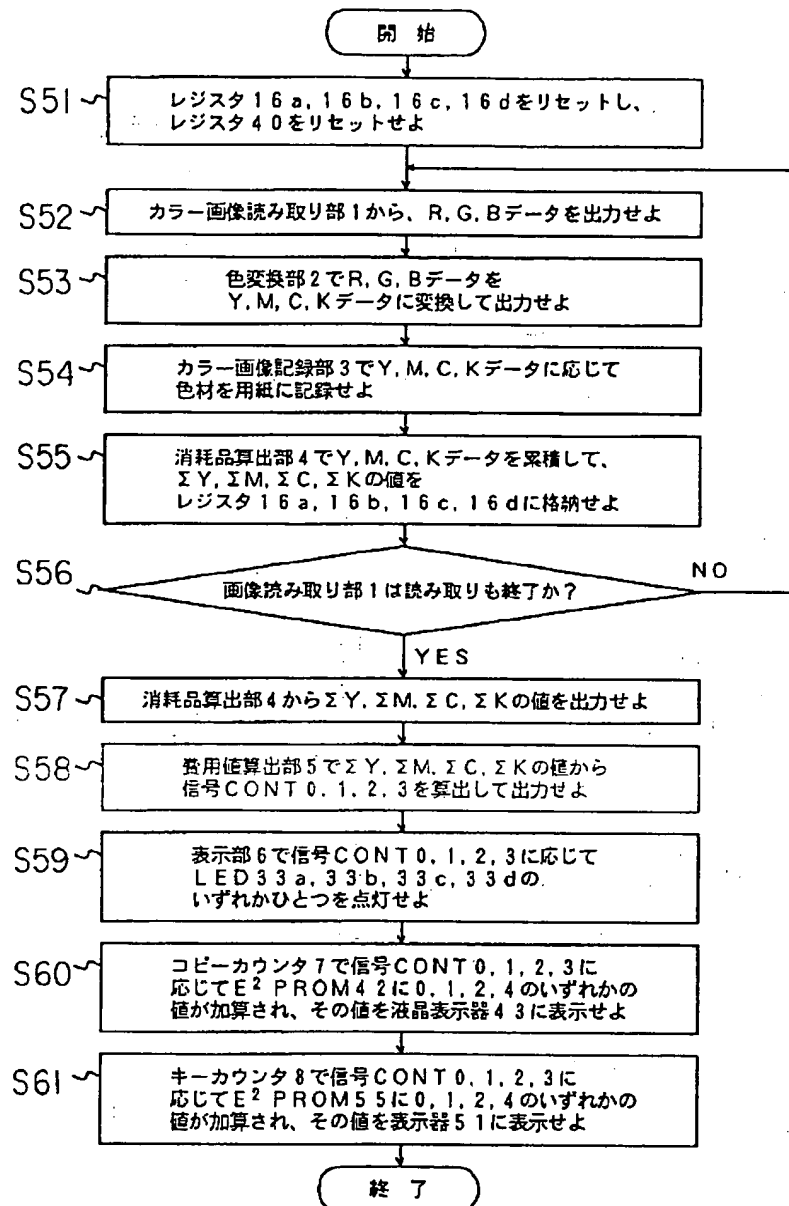


【図 25】



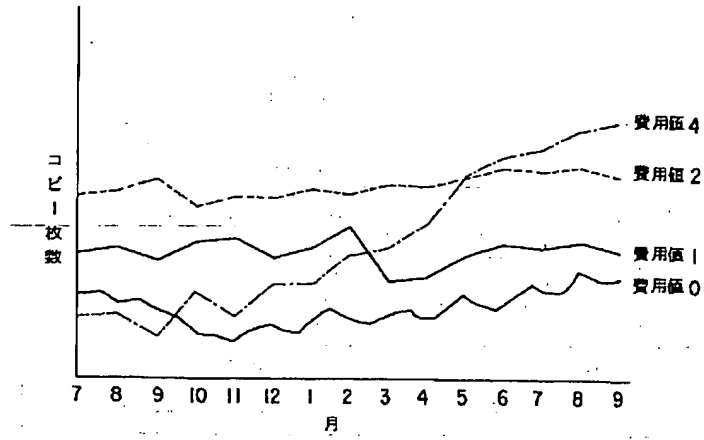


【図26】

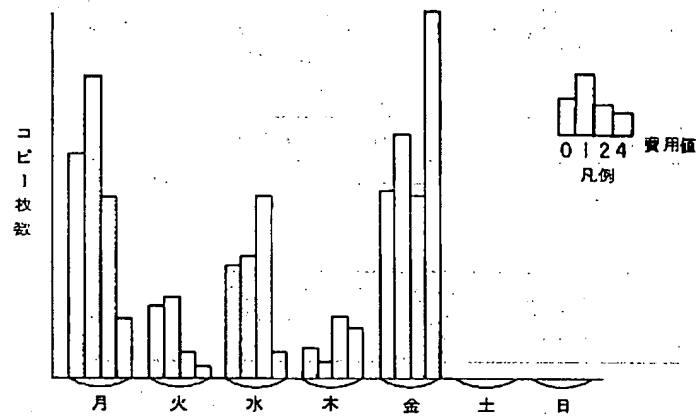




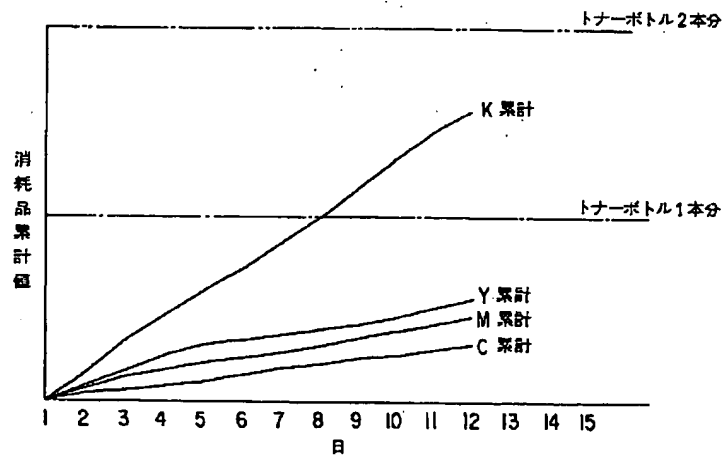
【図27】



【図28】

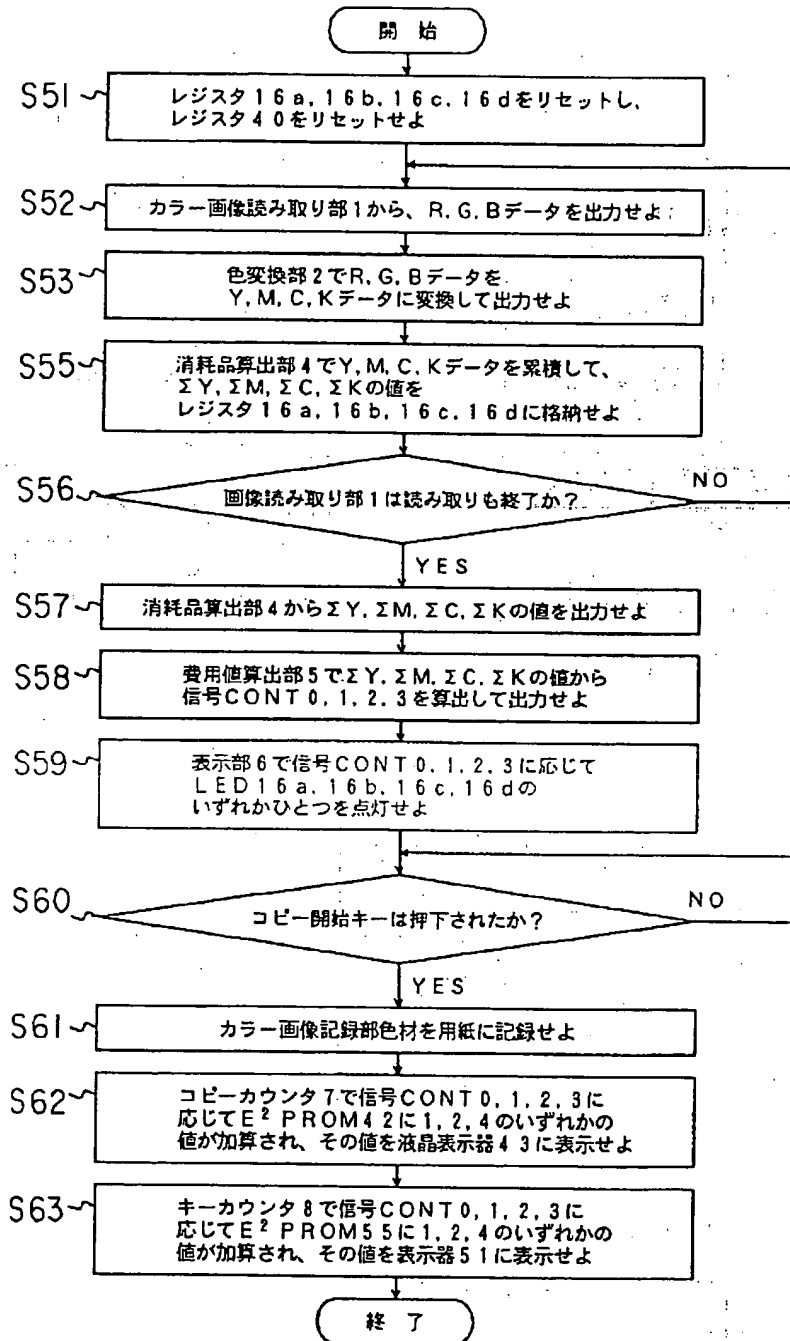


【図29】



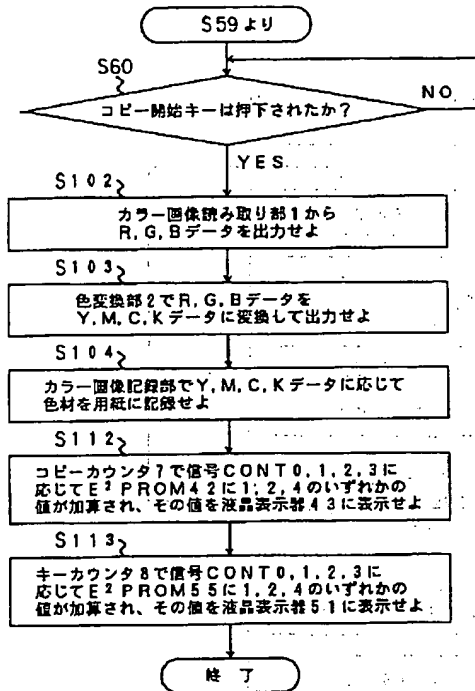


【図30】

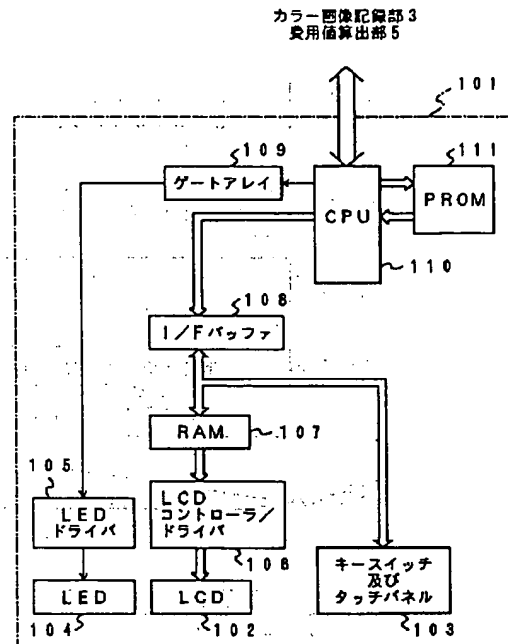




【図 3 1】



【図 3 4】



【図 3 2】

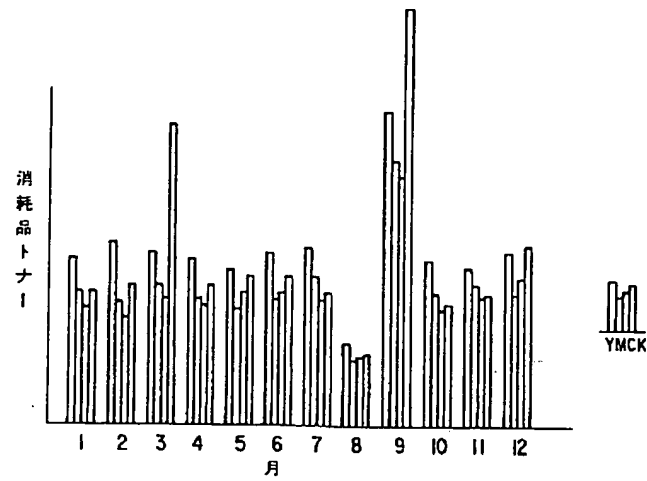
データ番号	時間情報	ΣY	ΣM	ΣC	ΣK	費用値
...	...	...	...	...	...	...
128	95/08/29/17/35/08	0	0	0	120	1
129	95/09/30/09/15/42	80	20	30	70	2
130	95/09/30/09/15/45	80	20	30	70	2
131	95/09/30/10/05/11	180	70	90	60	4
132	95/09/30/18/54/57	100	60	40	30	4
133	95/10/02/11/28/31	0	0	0	60	1
...	...	...	...	...	...	...

【図 3 7】

	モノクロ (0)	モノクロ (1)	カラー線画 (2)	フルカラー (3)
用紙	a	a	a	a
感光体等	4b	4b	4b	4b
トナー	c	2c	4c	20c
サービス人件費	d	d	d	d
マージン	e	e	e	e
費用値	a+4b+c+d+e	a+4b+2c+d+e	a+4b+4c+d+e	a+4b+20c+d+e



【図 35】





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